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INSTALLATION AND ACCEPTANCE TEST SPECIFICATION
(FINAL)

CDRL NO. B004

FOR

SINCGARS
AIRCRAFT INTEGRATED COMSEC DEVELOPMENT
(PHASE III)

CONTRACT NO. DAAB07-88-C-T041

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MILITARY SPECIFICATION

INSTALLATION AND ACCEPTANCE TEST SPECIFICATION FOR SINCGARS AIRCRAFT INTEGRATED COMSEC DEVELOPMENT (PHASE III)

This specification is approved for use by AVSCOM, Department of the Army, and is available for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification provides installation, equipment performance, engineering production approval instructions and requirements for installation and testing of the AN/ARC-201A(V) Aircraft system and associated equipment in prototype and production model aircraft. The MK-994 test set and auxiliary test equipment will be employed during many phases of the test program as specified herein.

2. PERTINENT SUPPLEMENTAL INFORMATION

2.1 Applicable Documents.

2.1.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

Military

MIL-B-5087	Bonding Electrical and Lightning Protection for Aerospace System
MIL-E-5400	Electronic Equipment, Airborne, General Specification for
MIL-C-6781	Control Panel, Aircraft Equipment, Rack or Console Mounted

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, US Army Communications-Electronics Command, ATTN: AMSEL-ED-TO, Fort Monmouth, New Jersey 07703-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC50985

Distribution Statement A Approved for public release; distribution is unlimited.

MIL-C-172	Cases, bases, mounting, and mounts, vibration (for use with Electronic Equipment in Aircraft)
MIL-W-5088	Wiring, Aircraft, Installation of
MIL-W-27500	Cable, Electrical, shielded
MIL-E-6051	Electromagnetic Compatibility Requirements, Systems
MIL-I-8700	Installation and Test of Electronic Equipment in Aircraft, General Specification for
MIL-C-45662	Calibration System Requirements
MIL-R-49265 w/Appendices A, B, C, D, & E	VHF-FM Portion of the Single Channel Ground and Airborne Radio Subsystem (SINCGARS)
MIL-C-55653	Control, Communications System (C6533( )/ARC)
MIL-C-49227(AV)	Control Unit Communications System C-10414(V)( )ARC, 1 Aug. 84
MIL-L-85762A	Lighting, Aircraft, Interior, Night Vision Imaging System (NVIS) Compatible

STANDARDS

Military

MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects
MIL-STD-877	Antenna Subsystems, Airborne, Criteria for Design and Location of
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461A (Notice 4)	Electromagnetic Interference Characteristics, Requirements for Equipment Subsystems and System
MIL-STD-462A (Notice 3)	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-704B	Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-1553B	Aircraft Internal Time Division Multiplex Data Bus

MIL-STD-188-100	Common Long Haul and Tactical Communications System Technical Standards
MIL-STD-188-114	Digital Interface Circuits. Electrical Characteristics of

2.1.2 Other Publications. The following documents form a part of this specification.

CSESD-14 (KY-57/58)	Communications Security Equipment System Document, TSEC/KY-57/58 (U) (CONFIDENTIAL)
AVRADA 0006F	Performance/Procurement Specifications for Interior Illumination of Army Aircraft in Electroluminescent (EL) Lighting. 6 April 1983
AV-SS-5016-001A	VHF/FM A[illegible]ne SINCGARS Radio. 29 Jul

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contacting officer.)

2.2 Equipment Description. Brief Description and Capabilities of the AN/ARC-201A(V) Aircraft System.

2.2.1 System Description

2.2.1.1 General Description. The radio System specified herein provides VHF-FM radio communications of voice and data, secure or plain text, in single channel (25 kHz) and the SINCGARS ECCM mode of operation and is intended to replace the equipment and functions now fulfilled by the AN/ARC-54, AN/ARC-131, and AN/ARC-114 and the FM functions of the AN/ARC-186. The radio subsystems are configured for rotary and fixed wing aircraft operation. They operate reliably in the varying electrical, mechanical, and climatic environments associated with these configurations. SINCGARS provides improved immunity from the threat of Electronic Warfare, and is interoperable, in all modes of operation, with the SINCGARS Manpack/Vehicular radio subsystems identified in 2.2.1.2a through 2.2.1.2g in addition to all the configurations of the AN/ARC-201A(V) listed in Section 2.2.1.2.1. It provides for secure communication of voice and data signals through interfacing with the Signal Data Converter.

2.2.1.2 SINCGARS Subsystems. The SINCGARS radio is comprised of the following subsystems:

a. Manpack Radio - RT-1523/VRC

b. Vehicular Radio - Short Range, AN/VRC-87( )(V)

c. Vehicular Radio - Dismountable Short Range, AN/VRC-88( )(V)

d. Vehicular Radio - Long Range, AN/VRC-89( )(V)

e. Vehicular Radio - Long Range/Short Range, AN-VRC-90( )(V)

f. Vehicular Radio - Long Range with Dismountable Short Range AN/VRC-91( )(V)

g. Vehicular Radio - Dual Long Range, AN/VRC-92( )(V)

h. Aircraft ARC-201

i. Aircraft ARC-201A

2.2.1.2.1 Aircraft Radio Subsystem. This subsystem incorporates the basic radio functions provided by AN/ARC-114, AN/ARC-114A, AN/ARC-54, AN/ARC-131, and the FM functions of the AN/ARC-186. The subsystem also provides amplitude homing, and ECCM capability. Guard receiver function is not required. The Aircraft Radio Subsystem consists of the following items:

ITEM	DESCRIPTION
1	Receiver-Transmitter Radio, Panel Mounted (RT-1476A/ARC-201A(V))
2	Receiver-Transmitter, Radio, Dedicated Remote (RT-1477A/ARC-201A(V))
3	Receiver-Transmitter, Radio, 1553B Remote (RT-1478A/ARC-201A(V))
4	Control, Radio Set, Remote (C-11466A/ARC-201A(V))
5	Mounting Base, Electrical Equipment (AN/ARC-131 Adapter Tray) (MT-6373/ARC-201(V))
6	Mounting Base, Electrical Equipment (MT-6374/ARC-201(V))
7	Converter, Signal Data (CV-4122(C)/ARC-201A(V))
8	Mounting Base, Electrical Equipment (MT-6710/ARC-201A(V), Adapter Tray)
9	Mounting Base, Electrical Equipment (MT-6709/ARC-201A(V), Hard Mount)

10	Battery Box, CY-8515/ARC-201A(V)
11	KYK-13, COMSEC Fill Device
12	MX-18290, ECCM Fill Device

2.2.1.2.1.1 Mechanical Configuration. The aircraft RT chassis is designed to accept the removable local control panel, the dedicated remote interface module, and the 1553B Remote Control Assembly. In all configurations, the objective is to maintain the AN/ARC-114 envelope. The back end of the RT unit is similar to the AN/ARC-186. All pin functions that are identical between the AN/ARC-186 and SINCGARS are maintained. Any additional signals are accommodated by an auxiliary connector. This connector includes the tune gate, tune clock, frequency data, and hop time signals for interface to an electronically tunable antenna or other auxiliary device. Interface lines to the IFM which include the 52 MHz filter switching control line are included in this connector.

2.2.1.2.1.2 Receiver-Transmitter, Radio, RT-1476A/ARC-201A(V) (Panel Mounted) (Item 1). This aircraft RT unit consists of a panel-mounted receiver-transmitter unit which will be mounted in the AN/ARC-114 cockpit space allocation. The Local Front Panel Control Unit which is part of this RT contains all controls and indicators. The panel-mounted radio is capable of remote control as specified in 2.2.1.2.1.5. Unless otherwise specified in 2.2.1.3 the requirements of the Local Control Unit are in accordance with MIL-C-6781.

2.2.1.2.1.3 Receiver-Transmitter, Radio, RT-1477A/ARC-201A(V) (Dedicated Remote) (Item 2). For aircraft requiring remote radio installation, the local Front Panel Control Unit of the Receiver-Transmitter RT 1476A Panel Mounted, specified in 2.2.1.2.1.2 is replaced by a dedicated remote front panel control interface. This front panel provides the interface between the radio and the Control Radio Set, Remote, C-11466A, specified in 2.2.1.2.1.5.

2.2.1.2.1.4 Receiver-Transmitter, Radio, RT-1478A/ARC-201A(V) (1553B Remote) (Item 3). Aircraft outfitted with a 1553B multiplexed data bus will use the aircraft SINCGARS RT with a 1553B Remote Front Panel Interface Assembly replacing the local front panel control unit of the Receiver-Transmitter, Radio, RT-1476A, Panel Mounted as specified in 2.2.1.2.1.2. The module shall contain all of the 1553B remote terminal components required for the dual redundant operation and provide for a self-contained microprocessor card programmed to format the MIL-STD-1553B messages into recognizable functions and transmit these to the RT unit. Redundant message transmitters and receivers (completely isolated from each other) are contained in the module. Two processor units are provided to perform redundant encoding and decoding.

2.2.1.2.1.5 Control, Radio Set, Remote (C-11466A/ARC-201A(V)) (Item 4). The unit provides the control functions for and operate in conjunction with the Receiver-Transmitter, Radio, RT-1477A, Dedicated Remote specified in 2.2.1.2.1.3. The control and display capabilities of this item shall be identical to the control and display capabilities of the local control unit

of the Receiver-Transmitter, Radio, RT-1476A, Panel Mounted except for the FILL input connector.

2.2.1.2 1.6 Mounting Base, Electrical Equipment, MT-6373/ARC-201(V) (AN/ARC-131 Adapter Tray.) (Item 5). This item shall provide the necessary power connector interfaces, both mechanically and electrically, to permit the installation of the Dedicated Remote RT unit within the existing MT-3664/ARC-131 shock-mounting tray. The adapter tray's overall configuration shall be similar to the AN/ARC-131 foot print. The dedicated remote RT unit shall be easily removed from the tray without special tools. This mounting base shall provide both mechanical and electrical connections necessary for the attachment of the Aircraft SINCGARS Battery Box (mounting hardware is not provided).

2.2.1.2.1.7 Mounting Base, Electrical Equipment, MT-6374/ARC-201(V) (Item 6). A mounting base shall be provided on which either the 1553B Bus Remote RT or the Dedicated Remote RT unit may be mounted. This tray shall be made of aluminum and shall not have vibration-shock isolators. Its mechanical hold-down devices shall permit easy installation and removal of the RT units.

2.2.1.2.1.8 Signal Data Converter (SDC) CV-4122(C)/ARC-201A(V) (Item 7). The Signal Data Converter shall provide for the transmission of analog and digital data necessary for operation of Voice, TACFIRE, ATHS, 16 kbps, and low-speed digital data. The SDC combines the functions of the Aircraft Data Rate Adapter (CV-3885) and the KY-58 COMSEC It is compatible with existing KY-58 and Z-AHQ configurations and can be remotely controlled from the Z-AHP (or compatible device), and locally controlled from the front panel of the SDC. It shall meet the same TEMPEST requirements as the Ground ICOM SINCGARS radio.

2.2.1.2.1.8.1 SDC Functions. The SDC shall process data signals (analog or digital) in a format identical to the ground ICOM SINCGARS equipment. Data operation with the Airborne Target Handoff System (ATHS) or local TACFIRE Digital Message Device (DMD) is required in aircraft installation. When operated in ADI or TF modes with ATHS or DMD, the SDC shall automatically identify whether the intercom transmit signal is voice or 1200/2400 Hz Frequency Shift Keying (FSK) data and process the signals appropriately. The following functions shall be provided:

a. Transmit signal identification

b. Receive signal identification

c. FSK demodulation to 600/1200 bps digital format of transmit FSK signal.

d. FSK modulation of 600/1200 bps digital to receive FSK signal format.

e. Majority logic error correction.

f. Data preamble insertion.

g. Interleaving/de-interleaving.

h. Transition insertion in plain text modes.

i. COMSEC '*' function.

j. 16 Kbps transparency.

k. PT voice override (NOT IN ALL CONFIGURATIONS).

2.2.1.2.1.9 Mounting Base, Electrical Equipment, MT-6710/ARC-201A(V) (Item 8). A mounting adapter shall be provided to enable the SDC to be installed in the existing MT-3802/ARC. Integrated cables will be provided for the mounting base to make the SDC unit compatible with existing remote configurations. The tray shall be designed for quick removal of the SDC unit from the MT-3802/ARC.

2.2.1.2.1.10 Mounting BAse, Electrical Equipment, MT-6709/ARC-201A(V) (Item 9). The Hard Mount Tray shall be provided for mounting the SDC in new remote installations. It shall be similar to the MT-6374/ARC-201V mounting base bulkhead mounting pattern. The mount shall be constructed of aluminum and shall have mechanical hold down devices to provide for the quick removal of the SDC unit from the mounting base.

2.2.1.2.1.11 Battery Box (CY-8515) (Item 10). The battery box is an auxiliary piece of aircraft SINCGARS equipment designed to provide additional system hold-up battery power. The battery box can be mounted beneath the MT-6373/ARC-201(V) mounting base. Hold up battery power is provided by five 1.5 volt "C" cells wired in series to an external connector.

2.2.1.2.1.12 KYK-13, COMSEC Fill Device (Item 11). The KYK-13 is a fill device designed to be used to fill the SDC with cryptovariables. The device is connected to a fill port of the SDC. The SDC is placed in LD mode, and fill is initiated by a "push to talk" (PTT) to the SDC.

2.2.1.2.1.13 MX-18290, ECCM Fill Device (Item 12). The MX-18290 is a fill device designed to be used to fill the RT-1476A, RT-1477A, RT-1478A with frequency hopping hopset variables. The device is connected to the fill port of the RT. The RT is put into the FH mode, LD position, and fill is initiated by pressing the LOAD button on the RT-1476A and RT-1477A. The RT-1478A initiates the fill with a 1553B bus command.

2.2.1.2.2 Configurations. Complete aircraft radio systems shall exist as combinations of various items described in 3.1.2.1 and are defined in the configurations specified in 3.1.2.2.1 through 3.1.2.2.4.

2.2.1.2.2.1 ARC-131 and ARC-54 Replacement. The following items shall form the aircraft radio systems which shall be a direct replacement for the radio sets ARC-131 and ARC-54.

ITEM	DESCRIPTION
2	Receiver-Transmitter, Radio, Dedicated Remote (RT-1477A)
4	Control, Radio Set, Dedicated Remote (C-11466A)

5	Mounting Base, Electrical Equipment (MT-6373) (AN/ARC-131 Adapter Tray)
7	Converter, Signal Data (CV-4122)
8	Mounting Base, Electrical Equipment (MT-6710) (SDC Adapter Tray)
10	Battery Box (Optional) (CY-8515)
11	KYK-13, COMSEC Fill Device
12	M 8290, ECCM Fill Device

2.2.1.2.2.2 ARC-114 Replacement. The following items shall form the aircraft radio system which shall be a direct replacement for the radio set AN/ARC-114 and 114A.

ITEM	DESCRIPTION
1	Receiver-Transmitter, Radio, Panel Mounted (RT-1476A)
7	Converter, Signal Data (CV-4122)
8	Mounting Base, Electrical Equipment (MT-6710) (SDC Adapter Tray)
10	Battery Box (Optional) (CY-8515)
11	KYK-13, COMSEC Fill Device
12	MX-18290, ECCM Fill Device

2.2.1.2.2.3 New Installation (Remote). The new remote mounted radio set shall be capable of two configurations as follows:

a. 1553B Controlled:

ITEM	DESCRIPTION
3	Receiver-Transmitter, Radio, 1553B Remote (RT-1478A)
6	Mounting Base, Electrical Equipment (MT-6374)
7	Converter, Signal Data (CV-4122)
9	Mounting Base, Electrical Equipment (MT-6709) (Hard Mount)
10	Battery Box (Optional) (CY-8515)
11	KYK-13, COMSEC Fill Device

b. Dedicated Control:

ITEM	DESCRIPTION
2	Receiver-Transmitter, Radio, Dedicated Remote (RT-1477A)

4	Control Radio Set, Dedicated Remote (C-11466A)
6	Mounting Base, Electrical Equipment (MT-6374)
7	Converter, Signal Data (CV-4122)
9	Mounting Base, Electrical Equipment (MT-6709) (Hard Mount)
10	Battery Box (Optional) (CY-8515)
11	KYK-13, COMSEC Fill Device
12	MX-18290, ECCM Fill Device

2.2.1.2.2.4 New Installation (Panel-mounted). The new panel-mounted configuration shall consist of the following items:

ITEM	DESCRIPTION
1	Receiver-Transmitter, Radio, Panel Mounted (RT-1476A)
7	Converter, Signal Data (CV-4122)
9	Mounting Base, Electrical Equipment (MT-6709) (Hard Mount - Optional)
10	Battery Box (Optional) (CY-8515)
11	KYK-13, COMSEC Fill Device
12	MX-18290, ECCM Fill Device

2.2.1.3 Essential Operational and Technical Characteristics. Except where specifically indicated otherwise, the following operations/technical parameters shall be minimum essential characteristics. Unless otherwise specified, they shall apply to each radio configuration.

2.2.1.3.1 Frequency Range. The frequency range shall be 30 to 87.975 MHz channelized in tuning increments of 25 kHz. In addition, a frequency offset tuning capability of -10 kHz, -5 kHz, +5 kHz, and +10 kHz shall be provided in both single channel receive and transmit mode; this capability is not required in the ECCM mode.

2.2.1.3.2 Occupied Bandwidth. Ninety-nine percent of the emitted spectrum of analog and digitized voice (16 Kbs) and data shall be contained within the 25 kHz channel. The design shall be optimized to support the basic 16 kbps requirement for the majority of SINCGARS users within a 25 kHz channel.

2.2.1.3.3 RF Power Output. The RT unit shall provide RF power output of +40 dBm (10 watts) $\pm$ 2 dB when connected to a 50-ohm load in single channel mode and +40 dBm +2, -3 in FH mode at +27.5 Vdc primary power.

2.2.1.3.4 . IFM Compatibility. The RT unit shall be capable of operating in conjunction with the AM-7189A/ARC, improved FM (IFM) power amplifier for purposes of extending the aircraft communications range of aircraft operating at nap-of-the-earth altitudes.

2.2.1.3.4.1 IFM Amplifier Control Interface. The IFM amplifier. AM-7189A/ARC is a variable power amplifier capable of providing RF output power at three levels between 2.5 and 40 watts using the nominal 10-watt RF output of the RT unit 's input. The three power levels shall be selected at the RT Control Unit (Local), Dedicated Remote, or 1553B. Mode control logic (including a 52 MHz filter switching signal, PTT, IFM fault and ECCM/SC select signal) shall be contained in the multi-pin connector of the RT Control Unit incorporating the basic functions of the IFM Control Unit (C-11188A/ARC).

2.2.1.3.5 Data Transmission. The SINCGARS system shall be interoperable/compatible with Army tactical data system. It shall provide a residual bit error performance of better than 10^{-4} in FH and 10^{-5} in SC mode when handling the following types of data in plain text or cipher text modes and voice frequency FSK at data rates of up to 1200 bits per second (bps) under normal operating conditions.

2.2.1.3.5.1 Digital Data. In the digital mode, a clock signal shall be supplied from the SDC to the interface with external data equipment to permit an inherent synchronous digital capability at the data rates of 600, 1200, 2400, 4800, and 16 kbps. The interface of the data and clock signals with the external data equipment shall conform to paragraph titled "clock", Equipment, Control, and Timing of MIL-STD-188-100 and MIL-STD-188-114 except that an unbalanced data input port is permitted, with a balanced input port being a design goal. There shall be no polarity reversal of digital data over a SINCGARS radio link.

2.2.1.3.5.2 Analog Data (AD1). Analog data shall be treated as an audio signal. The transmitter input impedance shall be 150 ohms nominal balanced and the interface level shall be 0 dBm nominal. The receiver output impedance shall be 150 ohms nominal balanced and the interface level shall be +17 dBm nominal.

2.2.1.3.5.3 TACFIRE (TF) ATHS Data (1200/2400 Hz FSK at Data Rate of 600 or 1200 bps. The SINCGARS radio with the SDC shall interoperate with TACFIRE terminal equipment in plain text mode, and in cipher text mode. In TF (AD2) mode, the FSK data is converted by the SDC to 16 kbps data to be transmitted by the RT. This process is reversed in the receiving SDC. This process improves the error performance of the data link.

2.2.1.3.5.3.1 Error Control. The system design shall provide additional measures to:

a. TACFIRE FSK equivalent bit error rate (BER) of 10^{-3} shall be attained in a 10^{-1} channel 16 kbps BER environment.

b. Retain a common interface port for TACFIRE FSK data and voice, in both plain and cipher text modes. If such measures entail the regeneration of FSK tones at the SINCGARS receiver, such an FSK signal shall be phase continuous with bit boundaries within $\pm$ 5° of signal zero crossings, and the tone frequencies and bit rates shall be within $\pm$ 0.1% of their nominal values. Bit interleaving shall be provided for burst error control.

2.2.1.3.6 Built-In-Test. Built-in-test shall be capable of operator initiation to ascertain system status. It shall be utilized by maintenance technicians for fault detection and isolation. As a design goal, BIT shall detect 95% of the faults in the SDC and 90% in the RTs and RCU.

2.2.1.3.7 Duty Cycle. The Radio Set shall meet all the requirements of this specification when subjected to a duty cycle of one (1) minute transmit and five (5) minutes receive.

2.2.1.3.8 Modes of Operation. The equipment shall provide the following operating modes for single channel (SC) and frequency hopping (FH):

a. Plain Text (PT), w/wo COMSEC Unit or SDC.

b. Cipher Text (CT), with COMSEC Unit or SDC.

c. Retransmission, PT/CT, SC or FH.

d. Frequency hopping, PT or CT, w/wo COMSEC Unit or SDC

e. Aircraft Homing PT/CT, SC only.

2.2.1.3.8.1 Plain Text (PT). A plain text (non-encrypted) information capability shall be a feature of all radio subsystems.

2.2.1.3.8.2 Cipher Text (CT) With COMSEC. A Cipher Text (CT) capability shall be a feature of each configuration using the Signal Data Converter.

2.2.1.3.8.3 Retransmission, PT/CT With or Without Electronic Counter-Countermeasures (ECCM). Retransmission shall be accomplished from 30 to 87.975 MHz on an f1-f2 basis using the equipment in a retransmit mode. A received signal of f1, whether clear or secure voice, shall activate a circuit which in turn shall key the transmitter of the other set on frequency f2. In single channel modes, the retransmitting radios shall detect the type of signal (analog or digital) being received and provide for the automatic transmission of either type signal. All digital retransmit signals shall be reclocked prior to retransmission.

2.2.1.3.8.4 Frequency Hopping Operation in PT and CT. Frequency Hopping capability shall be possible in PT and CT modes of operation.

2.2.1.3.8.5 Data Transmission.

2.2.1.3.8.5.1 16 kbps Digital Transmission. The SDC shall have the capability to provide for the transmission and reception of "transparent 16 kbps" digital data. The system shall provide for the transmission of these data signals in all modes of radio operation: PT SC, PT FH, CT SC, CT FH. In digital "transparent 16 kbps" mode, there shall be no data inversion between the audio/data connectors on transmitting and receiving SINCGARS systems. SDC interface with external digital data equipment shall be in accordance with MIL-STD-188-114.

The 16 kbps control shall provide a residual BER performance of no greater than the following at an RF input level of -89 dBm:

1×10^{-5} residual BER in single channel mode

1×10^{-4} BER in FH mode

2.2.1.3.8.5.2 Low Rate Digital Transmission (600 bps to 4800 bps). The basic control system shall be capable of providing for the transmission of 600, 1200, 2400, and 4800 bps digital data in all radio operating modes: PT SC, PT FH, CT SC, CT FH. In the transmission of low rate digital data, there shall be no data inversion between the transmitting and receiving SINCGARS system.

The radio shall have the capability of providing the data rate requirements listed below. (Normal room temperature) (Plain Text Mode).

Signal Type	Single Channel	Frequency Hopping	Required Performance
4.8 kb/s	-111 dBm	-110 dBm	10^{-3} BER
2.4 kb/s	-113	-112	10^{-3} BER
1.2 kb/s	-115	-114	10^{-3} BER
600 b/s	-115	-114	10^{-3} BER

2.2.1.3.9 Preset Channels.

2.2.1.3.9.1 Manual Mode. The radio set shall provide six preset channels, a manual channel, and a cueing channel (for use in the FH mode of operation) for all radio configurations. The preset channels shall select discrete frequencies in a SC mode and FH radio nets in the FH mode. The preset channels shall also be held in memory with an internal or external holding battery.

2.2.1.3.9.2 FH Capability. The system shall incorporate features to reduce its vulnerability to intercept, direction-finding, and jamming.

2.2.1.3.9.3 FH Operational Mode. All operating modes shall be compatible when loaded with the same FH HOPSET, Common Lockouts, and TRANSEC. FH Fill mode shall be compatible with the Ground ICOM Fill Device.

The Fill Format for the ICOM ECCM module shall be defined with TRANSEC appended to the HOPSETS.

2.2.1.3.9.4 Communication Security (COMSEC). All ICOM radio subsystems shall be capable of secured communications when utilizing the Signal Data Converter and shall be communication compatible with ARC-201 Receiver-Transmitter when equipped with a properly cabled KY-58.

2.2.1.3.10 Size and Weight. The size and weight of the airborne SINCGARS equipment shall not be greater than that specified in Table 2.2.1.3.10-1.

2.2.1.3.11 Frequency Accuracy and Stability. Frequency error is the deviation from the indicated channel frequency. The frequency error of the transmitter and/or the receiver shall be no greater than ±5 ppm (after a 5 minute warm-up period) for all environmental and input voltage conditions contained herein for a period of 2.5 years without recalibration after warm-up.

2.2.1.3.12 Supply Voltage. The equipment shall operate without degradation in specified performance, from 24 to 29 Vdc (27.5 Vdc nominal). At 21 Vdc the radio shall be operable with no degradation in receiver performance and minimum transmitter power output of 4 watts. At 17 Vdc and 30 Vdc, no damage shall occur per MIL-STD-704B. Reverse voltage protection and transients shall be per MIL-STD-704B, Category B.

2.2.1.3.13 Battery Selection. Batteries required for system operation shall be identical to the batteries used in the Ground ICOM SINCGARS equipment (BA-1372). A memory hold-up battery is used to retain non-volatile memory when primary power is removed from the RT. The non-volatile memory information retained includes ECCM memory, RT presets and time. Leads are brought out to the RT system connector to permit use of an external "holding battery". The Battery Box (CY-8515) was designed for this purpose (batteries are not supplied by ITT).

Table 2.2.1.3.10-1. Size and Weight for Aircraft SINCGARS Equipment

ITEM	DIMENSIONS	
PANEL MOUNT RT-1476A		
Overall Length	9.5	in
Depth Behind Panel	8.0	in
Height	4.125	in
Width	5.75	in
Volume	226.00	in^3
Weight	9.0	lbs
DEDICATED REMOTE RT-1477A		
Overall Length	10.0	in
Height	4.0	in
Width	5.0	in
Volume	200.0	in^3
Weight	10.0	lbs
REMOTE CONTROL HEAD C-11466A		
Overall Length	5.5	in
Depth Behind Panel	4.0	in
Height	3.0	in
Width	5.75	in
Volume	95.00	in^3
Weight	4.0	lbs
1553 RT-1478A		
Overall Length	10.75	in
Height	4.0	in
Width	5.0	in
Volume	210.0	in^3
Weight	10.0	lbs
SIGNAL DATA CONVERTER (CV-4122)		
Length	9.8	in
Height	3.75	in
Width	5.75	in
Volume	199.00	in^3
Weight	6.5	lbs
Length Behind Panel	8.4	in

Table 2.2.1.3.10-1. Size and Weight for Aircraft SINCGARS Equipment (cont'd)

ITEM	DIMENSIONS	
ARC-131 ADAPTER TRAY (MT-6373)		
Length	14.5	in
Height	5.6	in
Width	5.0	in
Volume	406.0	in^3
Weight	2.5	lbs
HARD MOUNT (MT-6374)		
Length	10.6	in
Height	2.4	in
Width	5.25	in
Volume	133.6	in^3
Weight	2.5	lbs
SDC ADAPTER TRAY (MT-6710)		
Length	7.75	in
Height	2.30	in
Width	5.05	in
Volume	91.0	in^3
Weight	2.5	lbs
SDC HARD MOUNT (MT-6709)		
Length	10.75	in
Width	7.0	in
Height	1.2	in
Volume	89.0	in^3
Weight	2.8	lbs
BATTERY BOX (CY-8515)		
Length	7.42	in
Height	1.47	in
Width	3.37	in
Volume	37.0	in^3
Weight	2.0	lbs

2.2.1.3.14 Tolerance to Load Variation. All systems shall withstand an infinite VSWR for 1 minute with no permanent damage. Degradation in performance shall be accepted.

2.2.1.3.15 Receiver Selectivity. When tested as a system, using another radio of the same type to generate the undesired signal, the desired signal output shall not be degraded below (a) 10% bit error rate or (b) 10 dB SINAD, under the following conditions: Desired signal input 5 dB above receiver 10 dB SINAD sensitivity and modulated with 16 kbs pseudorandom signal or 1 kHz tone, and an undesired signal modulation with a 17 kbs psuedorandom signal or 800 Hz tone at the following levels:

± f1	Undesired Signal Level Above Receiver Sensitivity (dB)
25 kHz	35
50 kHz	65
100 kHz	73
200 kHz	84
1 MHz	100
5 MHz	120
10 MHz	135

2.2.1.3.16 Receiver Input Circuit Protection. On-channel signal of 38 dBm applied for one minute shall not cause permanent degradation.

2.2.1.3.17 Receiver Audio Output. The receiver audio output shall be +17 dBm (50 mW/150 ohms) ± 3 dB adjustable to -18 dBm. The audio response (300-1900 Hz) shall follow the -6 dB/octave deemphasis network by ±2. -3.5 dB. The 150 Hz squelch tone shall be attenuated by a minimum of 35 dB, and the response shall be not less than 10 dB at 6000 Hz.

2.2.1.3.18 Tone Operated Squelch. The tone operated squelch circuit shall discriminate between transmissions on the same carrier frequency by means of a 150 Hz tone. The squelch shall open on signals that are tone modulated with a 150 Hz ±3 Hz at receiver sensitivity or greater with a frequency deviation of 2.5-7.5 kHz p-p.

2.2.1.3.19 Receiver Delay Times. The equipment receiver delay time shall be:

a. Receiver attack ≤ 40 ms for SC Analog and ≤ 25 ms for SC Digital

b. Receiver release ≤ 60 ms for SC Analog

2.2.1.3.20 Transmitter Noise Level. The equipment transmitter noise level shall be ≤ -172 dBc/Hz at frequencies ± 10 MHz from the carrier.

2.2.1.3.21 Transmitter Audio Input Sensitivity. The equipment transmitter audio input sensitivity shall be 0 dBm (1 mW, 387 mVrms) for an FM deviation of 16-22 kHz p-p (including squelch tone).

2.2.1.3.22 Sidetone. The equipment sidetone shall be 3 to 9 dB below receiver output. If the transmit power output is low (under 4 watts, nominally) sidetone is disabled.

2.2.1.3.23 Transmitter Delay Times (see 6.3). The equipment transmitter delay times shall be:

a. Transmitter attack $\leq$ 50 ms

b. Transmitter release $\leq$ 12 ms

c. Transmit after receive $\leq$ 80 ms

2.2.1.3.24 Control Panel Illumination. Front panel displays shall conform to the following requirements.

2.2.1.3.24.1 Aircraft Control Panel Illumination. The aircraft local control panel and Control, Radio Set, Dedicated Remote shall have electroluminescent (EL) back-lighting in accordance with AVRADA 0006F.

2.2.1.3.24.2 Signal Data Converter Front Panel Illumination. The SDC front panel shall meet the requirements of MIL-L-85762A to ensure compatibility with ANVIS GEN III devices. The panel shall be incandescent backlit and shall operate from an externally supplied +28 Vdc.

2.2.1.3.25 Electronic Counter-Countermeasures (ECCM). SINCGARS shall incorporate several features to reduce its vulnerability to intercept, direction finding and jamming. Those features to be provided by the radio equipment shall include the SINCGARS frequency hopping waveform.

2.2.1.3.26 TEMPEST. The TEMPEST requirements are contained in Appendix B of Product Specification Receiver-Transmitter Electrical Equipment, RT-1476A/ARC-201A(V).

2.2.1.3.27 Aircraft (Amplitude) Homing.

2.2.1.3.27.1 Homing Sensitivity. The overall sensitivity of the homing system shall be such that the aircraft can obtain course heading information and place the RED flags in the down position on Indicator ID-1351/A, or equivalent at a signal level of > -103 dBm $\pm$ 10 dB at the applicable homing signal frequency.

2.2.1.3.27.2 Homing Mode Resolution. When the radio set is placed in the homing mode, and signals are present across the 50-ohm inputs, the homing system shall operate so that the movements of indicator ID-1351/A, or equivalent, shall indicate the conditions in 2.2.1.3.27.2.1 through 2.2.1.3.27.2.4.

2.2.1.3.27.2.1 Station Approach Indication. A station approach signal shall be capable of driving a 0-150 µA, 1000 ohms meter movement. The output current shall increase monotonically from a value of 0 $\pm$ 25 µA for an input level of -103 dBm to a value of 150 µA +50, -30 µA for a signal of -30 dBm or greater.

2.2.1.3.27.2.2 Equal Amplitude Dynamic Range. The homing needle drive current shall be 0 ± 25 μA for RF power levels between -103 dBm and -40 dBm when applied equally to the left and right homing inputs.

2.2.1.3.27.2.3 Deflection Dynamic Range. Signal level differentials from zero (0) to three (3) dB referenced to -100 dBm, shall deflect the homing needle from center scale, with 0 dB differential to a minimum of 100 microamps with the 3 dB differential. With the fixed 3 dB differential, the output unbalanced current deflection shall be between 100 microamperes minimum and 450 microamps maximum.

2.2.1.3.27.2.4 Deflection Symmetry. With a fixed 3 dB differential adjustment and with an input signal level of -47 dBm, the output unbalanced current reading shall be between 100 and 450 microamperes. With the ± 3 dB differential adjustment reversed, the current reading shall be within 30 percent of the previous value, but of opposite polarity referenced to the measured reading at -47 dB.

2.2.1.3.27.3 Communication While Homing. With the radio in the homing mode, operation of the push-to-talk switch shall automatically switch from the homing circuits to the communication antenna while transmitting.

2.2.2 Nuclear Survivability. All contractor-furnished mechanical configurations, electronic assemblages, electronic equipment, electronic circuits and electronic components shall withstand the nuclear environment as specified in the contract. The equipment shall meet the operational requirements of Section 3 herein, immediately after being subjected to the specified nuclear environments. The equipment shall be energized during exposure. The plastic edge-lit panels are excluded from the thermal requirements.

2.2.2.1 Nuclear Survivability Mission Description. All system components must be able to survive a nuclear event while energized without the loss of mission essential information in any of the contractor-developed or contractor-furnished SINCGARS equipment. Mission essential information consists of stored information, such as R/T presets, manual mode operating frequency (if in that mode), the built-in tests capability, ECCM variable(s), COMSEC variable(s), and any additional information necessary for operation in both hopping and non-hopping modes. All ECCM variables stored in the ECCM fill device and net control device along with those stored in the ECCM module are considered to be mission essential information. Mission essential information does not include the analog or digital information being transmitted at the time of the nuclear event. System disturbance caused by the nuclear event can be solved by accepted operator action, such as turning the equipment(s) off and then on, as well as retransmitting the analog or digital information lost during the event. All SINCGARS Communications Security Modules must be able to survive the stated nuclear specifications, while energized, without loss of mission essential information. Mission essential information consists of stored information such as the crypto talk variable(s), remote keying variable(s) and any additional information necessary for analog or digital operation. The analog or digital information being transmitted at the time of the

nuclear event is not considered mission essential. A system disturbance caused by the nuclear event, which can be solved within five minutes following the event by operating procedural techniques such as turning the equipment(s) off and then on or cycling the push-to-talk (PTT) switch, as well as retransmitting the information lost during the event, is considered acceptable. The requirements shall be as specified in Nuclear Survivability, Appendix A.

2.3 List of Acronyms and Abbreviations Used in This Document

A/C	Aircraft
ANC	Ancillary
APP	Approach
BIT	Built-in-Test
CT	Cipher Text
CTL or CONT	Control
DN	Down
DRA	Data Rate Adapter
FH	Frequency Hop
FM	Frequency Modulation
FSK	Frequency Shift Keying
GND or GRD	Ground
GFE	Government Furnished Equipment
I/C	Intercom
LT	Left
MAN	Manual
MIC	Microphone.
OPR	Operate
PT	Plain Text or Pointer
PTT or PTTO	Push to Talk (out)
PWR	Power
RCU	Remote Control Unit
RCV or RECD (RCVR)	Receive (Receiver)
RET or RTN	Return
RT	Receiver-Transmitter or Right
RXMT	Retransmit
SC	Single Channel
SDC	Signal Data Converter
SEL	Select
STA	Station
STR	Strength
SYS	System

w/	with
wo/	without
XCVR	Transceiver
XMIT (XMTR)	Transmit (transmitter)

2.4 Operational Description. Individual control functions are grouped or ganged together on single switches to provide isolation of functions where possible. The number of sequential actions required to initiate an operation is minimized to reduce errors and confusion. Presented here is an explanation of the controls available, what they are and how they are used. Each of the three configurations are covered with repetitive functions described only once.

2.4.1 Aircraft Radio Subsystem. The Aircraft radio subsystem is configured around a basic Aircraft RT. Interchangeable front panels convert the RT for use in the local cockpit console or as a dedicated remotely controlled radio or a 1553B remotely controlled radio. Externally mounted equipment operates in conjunction with the RT to provide specific capabilities. This external equipment includes the Remote Control Unit (RCU) and the Signal Data Converter (SDC). The controls, indicators, and connectors on the equipment listed, along with an explanation of their function and operation, is presented to establish the operational relationship to the subsystem equipments.

Each interchangeable RT front panel interface module will be described in addition to the control head and the SDC.

2.4.1.1 Panel Mounted RT. The front panel of the panel mounted RT is shown in Figure 2.4.1.1-1 and its functions are described as follows:

a. FUNCTION Switch. Used to select the basic operational condition of the aircraft RT.

b. MODE Switch. Used to select the mode of operation: homing, single channel, frequency hopping, or frequency hopping/master.

c. PRESET Switch. Used to select one of six preset frequencies, manual operation or a CUE channel.

d. IFM RF POWER Switch. Used to select one of four pre-determined levels of RF power amplification by the AM-7189/A IFM power amplifier.

e. VOL Control. Used to vary the radio output volume level.

f. Display. Is a 5-digit, 7-bar, LCD, variable brightness readout.

g. Keyboard. Is a 15-button array of key switches for data insertion/modification/display.

h. FILL. Used to load ECCM variables.

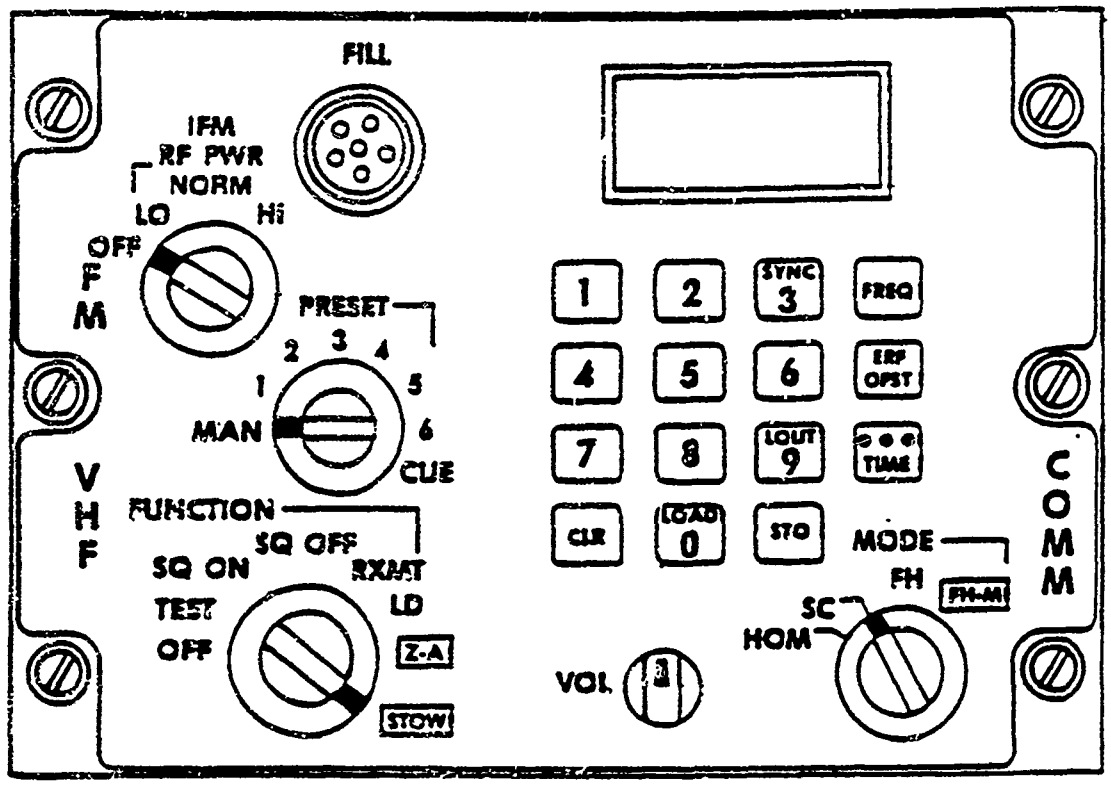


Figure 2.4.1.1-1. ICOM RT-1476A Front Panel

2.4.1.1.1 Detailed Descriptions. A detailed description of each switch, indicator, and connector is presented.

a. FUNCTION Switch. The RT FUNCTION switch is used to select the basic operational condition within the RT. It is an eight-position switch with positions one, seven, and eight being isolated switch positions. Isolated switch positions require a pull and turn action to operate. Position one is OFF, seven is Z-A (Zero All) and position eight is STOW. Actions initiated by these switch settings are sensitive to the operation of the RT and are therefore designed to require a conscious effort of the operator to activate. The positions of the FUNCTION switch are:

1 OFF (Primary Power OFF, Memory ON)

2 TEST (Test)

3 SQ ON (on)

4 SQ OFF (Squelch OFF)

5 RXMT (Retransmit)

6 LD (Load)

7 Z-A (Zeroize All)

8 STOW (Stow or Storage)

A discussion concerning each switch position and function is as follows:

1 OFF. In this position, all primary power is removed from the RT. The memory holding battery, however, is connected to its associated circuitry providing the retention of stored FH parameters, time and preset frequencies. This position is used during limited periods of inactivity where the reloading of FH parameters and presets is undesirable. For instance, between missions or overnight. Time is valid for a maximum of 24 hours with no primary power.

2 TEST. In this position, the major components of the subsystem are examined to verify their operation. The RT is tested under microprocessor control. The results of the self-tests are presented on the front panel displays.

3 SQ ON (Squelch On). In this position, all primary power is applied and operation will be by normal

locally controlled actions. The squelch is enabled and the RT operation modified by other front panel controls. Receive/transmit operation is controlled by an intercom/headset, or handset.

4 SQ OFF (Squelch Off). The operation of the RT with the switch in this position is identical to the SQ ON position except the squelch circuits are disabled. This position provides the capability to communicate at extremely low input levels (below the squelch break level) primarily in voice operation, if required.

5 RXMT (Retransmit). In this position, all primary power is applied and the RT is in a normal receive mode. This position is used in conjunction with another equipment, configured in an F1-F2 radio relay link. Transmitter keying is by the interconnected unit and vice versa. Modes of operation can be both radios in single channel or both radios frequency hopping. Reception of a signal by one equipment will automatically key the other. Interconnection is made by the appropriate multi-conductor cable attached to the rear of the RTs.

6 LD (Load). In this switch position all primary power is applied to the RT and the transmitter is enabled. With the FUNCTION switch in LD, loading of preset frequencies is accomplished by normal keyboard entry in conjunction with the PRESET switch. Also, time may be set with the switch in LD. ECCM net parameters and lockout channels are also filled with the switch in this position, by connecting the appropriate fill device to the FILL connector and pressing the keyboard LOAD button once.

7 Z-A (Zero All). This switch position is an isolated or guarded position requiring a pull and turn action to operate. All primary power is applied; however, transmitter keying is inhibited. When the switch position is activated, the ECCM variables and SC presets are zeroed. The non-volatile RAM in the ECCM and control modules are tested and the results displayed. This is not an operational position but is used to clear the TRANSEC variable to avoid a security compromise.

8 STOW (Stow). In this position all power is removed from the RT circuits including those circuits energized by the holding battery. All functional circuits and the non-volatile memory circuits are inactive. This switch position is an isolated position requiring a pull and turn operation by the user. Normal use would provide complete disable of all radio circuits during an extended period of inactivity such as storage.

b. MODE Switch. The MODE switch is used to select one of four basic operational modes. It is a four-position switch with the fourth position used to select a variation of the third (or FH) position. The positions of the MODE switch are:

1 HOM (Homing
2 SC (Single Channel)
3 FH (Frequency Hopping)
4 FH-M (Frequency Hopping/Master)

1 HOM. With the MODE switch in the HOM position, the left and right homing antennas are active, the normal communications antenna is disconnected and the radio is set to the single channel mode and is at the frequency selected by the preset switch. The communication antenna is reconnected automatically for the length of any transmission. When in the HOM position, the cockpit instruments are enabled providing the pilot with steering, station approach, and signal strength indicators. These functions are disabled when the MODE switch is in the other positions.

2 SC (Single Channel). In this position, the single channel mode of operation is selected with the FUNCTION switch in an operational position. Manual selection of operating frequencies is determined by the setting of the PRESET switch. With the PRESET switch in MAN, frequencies are selected via keyboard entry. With the PRESET switch in any of the numbered positions (1 through 6) or CUE, preset frequencies are selected. Offsets may be applied to either manual or preset frequencies while in the SC mode. The MODE switch must also be in the SC position when loading preset frequencies. In this case, however, the FUNCTION switch must be in the LD (load) position.

3 FH (Frequency Hopping). In this switch position, the frequency hopping mode of operation is selected. The PRESET switch positions (1 through 6) now select a particular set of frequency hopping net parameters. Positions MAN and CUE of the PRESET switch are invalid

operating positions in the FH mode. In MAN, the display will show 'COld', and in CUE, the display will show the frequency as though in SC. The FUNCTION switch must be in an operational position. Switching positions of the PRESET switch will facilitate rapid change in operating nets.

4 FH-M (Frequency Hopping/Master). Operationally, this position is identical to the FH position, except that it is a guarded pull and turn switch position. The operation of the FH nets are time dependent and the accuracy of time, as it is registered in each equipment, is of significant importance. The system will allow for a considerable misalignment in time between equipments; however, some relative standard or master within a net must be established to prevent gradual time creepage during normal communication. One radio shall, therefore, be designated as master. This means that time differences will always be accommodated in the other radios and not the master. In this manner, the net control station, or master, is designated as the time standard for all communicating equipments within a net.

c. PRESET Switch. The RT PRESET switch is used to select specific predetermined operating conditions within the RT. The switch is an eight-position switch whose function is actually two-fold. In a normal single channel mode, (SC on the MODE switch), either manual or preset frequencies are selected. In a frequency hopping mode (FH or FH/M on the MODE switch) frequency hopping nets are selected. The switch is also used in single channel operation or as a special signaling frequency in the FH modes. Table 2.4.1.1.1-1 lists the operating and LOAD/FILL conditions of the switch which are as follows:

1 MAN Position. The MAN (manual) position is used in the single channel mode to select any operating frequency, within the prescribed band, in 25 kHz increments. Frequencies are entered directly by the keyboard. Offsets of ±5 or ±10 kHz may be applied to any selected frequency. Offsets applied to manually selected frequencies will be retained until a new frequency is selected or until offsets are cancelled. Retention of offsets to manually selected frequency will be in effect even though the PRESET switch is moved from MAN to a preset frequency and returned to MAN. The MAN position is invalid for other positions of the MODE switch (FH or FH/M) and an indication of "COld" will be in evidence on the display.

2 Positions 1 through 6. It is the numbered positions of this switch that actually serve a multipurpose. In the

single channel (SC) mode, preset frequencies are selected or loaded. Frequency selection occurs if the FUNCTION switch is in an operational position and preset loading occurs if the FUNCTION switch is in the LD (load) position. The display will indicate the preset frequency selected providing a frequency has been loaded previously. If frequency data had not been loaded in the preset selected position, or if it had been zeroized, the display will indicate "FILL" and the position number. Offsets of ±5 or ±10 kHz may be applied to any preset and will be retained, even when switching between presets, until cancelled. In the FH or FH-M mode, frequency hopping nets are selected according to predetermined preloaded data. It is not necessary to use the PRESET switch when loading FH parameters; however, it is when selecting particular nets. When a FH net is selected, the display will indicate "FH" followed by a number corresponding to the valid FH data which had been loaded previously. If valid data is not available for the net selected, the display will indicate "FILLn". (n=preset number).

3 CUE Position. The CUE position is a special signaling channel used by a non-ECCM radio to signal, or CUE, an ECCM radio. The CUE channel in single channel (SC) operation is in effect a seventh preset and all considerations that apply to a numbered preset are applicable. In a typical ECCM CUEing operation a radio operator with a non-ECCM equipment attempting a contact within an ECCM net would place this switch to CUE and key the transmitter. The ECCM radio provides an audible tone and a visual indication that contact is desirable. The display will indicate "CUE" for a period of 7 seconds and a tone will be apparent in the handset earpiece for 2 seconds each time the non-ECCM radio is keyed. The Non-ECCM radio must be keyed for at least 4 seconds to insure reception by the ECCM radio. The ECCM radio would then be switched to the single channel CUE or some other pre-determined frequency to establish contact. The CUE channel is an invalid position in the FH mode and the radio will operate in SC mode.

Table 2.4.1.1.1-1. Preset Switch Functions

Operating Conditions

	Single Channel		Frequency Hopping	
	Switch Position	Frequency	Switch Position	Frequency
FUNCTION Sw.	Any Operation Position		Any Operation Position	
MODE Sw	SC		FH or FH-M	
PRESET Sw	MAN	Man Keybd Entry	MAN	COld
	1	Preset Freq 1	1	FH Net 1
	2	Preset Freq 2	2	FH Net 2
	3	Preset Freq 3	3	FH Net 3
	4	Preset Freq 4	4	FH Net 4
	5	Preset Freq 5	5	FH Net 5
	6	Preset Freq 6	6	FH Net 6
	CUE	CUE Freq	CUE	CUE Freq

Load/Fill Conditions

	Single Channel		Frequency Hopping	
	Switch Position	Frequency	Switch Position	Frequency
FUNCTION Sw.	LD		LD	
MODE Sw	SC		FH or FH-M	
PRESET Sw	MAN	*Frequency	Preset Sw positions are of no consequence. FH parameters are loaded via fill device. Fill is initiated by pressing LOAD once. Hopsets (and appended TRANSEC variables) are loaded in LD.	
	1	Preset Freq 1		
	2	Preset Freq 2		
	3	Preset Freq 3		
	4	Preset Freq 4		
	5	Preset Freq 5		
	6	Preset Freq 6		
	CUE	CUE Freq		

*Frequency can be entered with Function Switch in other position besides LD.

d. IFM RF PWR (IFM AM-7189/A RF POWER). This switch is used to select the OFF mode or one of three RF output power levels of the AM-7189/A Power Amplifier. The switch positions and approximate output power levels are listed below:

OFF	(Bypass)	10 Watts
LO	(Low Power)	2.5 Watts

NORM	(Normal Power)	10	Watts
HI	(High Power)	40	Watts

The RF output level of the Aircraft RT is constant at 10 watts (+40 dBm).

e. VOL Control. The VOL (volume) control is a potentiometer which serves to vary the headset receiver volume. The volume control is used to adjust receiver volume to a comfortable level consistent with the operator's environment.

f. Display. The display is a 5-digit, 7-segment LCD readout. The capability is provided to vary the brightness from full sunlight viewability to a low level compatible with night vision goggles. The display will be on continuously and the information presented will be a function of other switch settings or keyboard entries. The display generally operates in conjunction with the keyboard. However, there are some exceptions. With the FUNCTION switch in an operational mode, the MODE switch in SC, the frequency stored at a particular location of the PRESET switch will be displayed. Changing the PRESET switch position will automatically cause the new frequency corresponding to the new switch location to be displayed. Frequency or the hopset number is normally visible on the display except in certain cases such as time, ERFing, etc. Depression of the FREQ button on the keyboard will display the current operating frequency or hopset number after such times. As mentioned earlier, the delta frequency offsets (±5 or ±10 kHz) are operative in either MAN or a numbered preset position of the PRESET switch. These offsets, once applied, will be displayed as the true operating frequency when FREQ is pressed. Time is also available for display in any operational mode. Time is indicated in a 24-hour system by days, hours/minutes, and minutes/seconds. CUE will also be displayed in an ECCM operational mode. Available also are a number of Built-In-Test (BIT) and status words indicative of internal conditions within the RT. See Section 2.5 "Self Test Description" for details of these status indications.

g. Keyboard. The keyboard is a 15-button array of pressure switches arranged in a 4 x 4 matrix. The keyboard is used to insert or display data, depending on the key switch actuated and the positions of the MODE and FUNCTION switches. The keyboard is comprised of 10 numerical buttons, three special function buttons, and two command buttons. The three special function buttons are located on the right hand side of the keyboard. The two command buttons (CLR and STO) are located on either

side of the numerical zero button. The special function buttons will always initiate a display according to the function of the button pressed. Pressing TIME will display time, pressing FREQ will display frequency, etc. Pressing CLR always clears only the displayed data, pressing STO always enters the displayed data into the system and is always signaled by a momentary "blink" of the display. When the CLR button is pressed, the displayed digits (two, four or five dependent upon the displayed information) will have the numeric replaced by a horizontal line at the bottom of each digit. This "underline" feature aids the operator in knowing where entered data will appear. In the following text, this is referred to as clearing the display even though the "underlines" appear. A description of the key switches and their function is presented.

1 Switches 1 through 9. Decimal inputs are used to key in frequency, load time information, or offsets. Entry of information is normally digit-by-digit displayed left to right on the readout. It is to be noted that operation of the RT is not altered until complete, valid data is registered on the readout and the keyboard STO button depressed within the 7 sec time out period. Illegal entries will not register on the display. Incomplete entries will not be accepted when STO is pressed. Acceptance of valid data is signaled by a momentary "blink" of the display when STO is pressed. At this time, the RT will be caused to act upon this entry. Partial or mistaken data may be erased at any time by pressing CLR, at which time the last readout will be cleared. Manual frequencies can only be selected with the FUNCTION switch in an operational position and the MODE switch in SC. With the FUNCTION switch in LD and the MODE switch in SC, new preset frequencies may be entered in conjunction with the numbered positions of the PRESET switch. With the FUNCTION switch in LD, TIME may be entered or altered by pressing TIME, then CLR. In all cases, pressing the CLR prior to an entry will clear the display allowing new data to be registered, however, the function of the RT is not altered internally until STO is pressed and accepted.

2 CLR. The CLR button is used to zeroize the display. CLR must be pressed to remove the old data from the display prior to entering new data during LD, or changing frequencies during a manual operation. It can also be used to clear partial or erroneous entries. It is to be noted that pressing CLR does not change the operation of the RT, it only erases the data being displayed on the readouts to underlines appearing in

the digit position where a number had been displayed previously.

3 0 (LOAD). The 0 (zero) switch is used to enter zeros in the same manner as switches 1 through 9 as defined in paragraph 2.4.1.1.1.g.1. It has a second action (LOAD) which initiates transfer of ECCM parameters.

4 STO. The STO button is used to initiate entry of all data by keyboard entry. In all cases, only valid complete entries will enable the STO button. Successful initiation of the entry action will always be signaled by a "blink" of the display. If the CLR button is pressed prior to STO, valid data must be registered before STO will be accepted.

STO has a second function of storing a received Hopset or Lockout Set held in holding memory. Selection of the preset (1-6) is necessary.

5 FREQ. The FREQ button is used to display the current operating frequency during single channel (manual or preset) operation. It is also used in loading preset frequencies; however, the FUNCTION switch must be in the LD (load) position. Whenever the button is pressed, frequency is displayed and an entry sequence is initiated involving frequency. If the frequencies stored within the radio (presets and current manual) had been zeroized (Z-A on the FUNCTION switch), then "FILL" and the number of the preset will be displayed when FREQ is pressed until new valid frequencies are entered. If the operating frequency currently in use has been offset, the true operating frequency (plus or minus offset) will be displayed.

In FH, the hopset number is displayed when the FREQ button is pressed. If a lockout is loaded into the RT, a second press of the FREQ button will display the lockout that is loaded.

6 ERF. The ERF/OFST (offset) button is used to modify a single channel operating frequency, manually selected or preset, to include offsets of ±5 or ±10 kHz. The offsets to be applied to the basic frequency are displayed by themselves in the two right hand digits of the display. The FUNCTION switch can be in any operational position, however, the MODE switch must be in SC to apply offsets. Pressing ERF/OFST will immediately display any current valid offset applied to the selected single channel frequency. Negative offsets are indicated by a negative signal (-) appearing in the center digit position. Positive offsets are indicated by no prefix. No offset is

indicated by "00" in the two right hand digits. To apply an offset, the ERF/OFST button is first pressed. The CLR button must then be pressed. If a negative offset is desired, ERF/OFST must be pressed again. A negative sign will appear in the center digit position. (Repeated pressing of ERF/OFST will alternate between plus and minus offsets). The keyboard must now be used to insert either five or ten. If five is pressed, "05" will automatically appear. If 10 is required, 1 then 0 must be pressed. All other buttons will be inactive and nothing will be registered if accidentally pressed. Once the valid offset is registered on the display, along with a minus or plus (no indication) sign, the STO button is pressed. The display will momentarily blink signaling acceptance and initiating frequency offset immediately. If the FREQ button is pressed at this point, it will display the original operating frequency with the offset added or subtracted to it. To cancel an offset, proceed as before; that is, press ERF/OFST first to display existing offsets. Then press CLR followed by 0, which will cause "00" to be displayed. When STO is pressed, an offset of "00" is entered returning the operating frequency to its non-offset condition.

ERF/OFST has a second function of initiating an ERF transmission if a Hopset or Lockout Set is in the holding memory and the Mode Switch is in the FH-M position.

7 TIME. The TIME button on the keyboard is used to display or change the time setting maintained within each RT. Time is displayed in three separate individual fields in days (0 through 99), hours (0 through 23), minutes (0 through 59), and seconds (0 through 59). Days are displayed in the two left hand digits immediately when TIME is pressed. Pressing TIME again will cause the field to change to the two left hand digits of the second field, minutes in the two right hand digits. The center digit remains OFF. Pressing TIME the third time results in the third (minutes/seconds) field being displayed. Minutes are displayed in the two left hand digits and seconds are displayed on the two right hand digits of the display. The center digit remains off. When TIME is displayed and CLR has not been pressed, the seconds will be running. When CLR is pressed, the internal clock continues to run, but the display will be static, displaying entry information only. To set or reset time requires that the FUNCTION switch be in the LD (load) position. The positions of the MODE and PRE[illegible]

switches are of no consequence. With the FUNCTION switch in LD, the TIME button is pressed once displaying days in the two left hand digits. Press CLR (clear) and the two digits will be removed. The new days numbers may then be inserted by keyboard entry. Once the new days numbers have been registered, the STO button is pressed and the display caused to blink momentarily. The new days numbers are now entered and stored. Once the new days have been entered, the TIME button must again be pressed to change to the second field (hours and minutes). The previous hours and minutes are displayed in the two extreme left hand and right hand digits, respectively. CLR is then pressed to remove the old hours/minutes display and is replaced by underlines at the bottom of each digit previously displaying a number. The new hours and minutes numbers (four digits) are then entered by keyboard entry. Once STO is pressed, the display blinks and the new data is registered. As mentioned before, when the new hours/minutes numbers are registered, the registered numbers are static and displayed time is not changing. When STO is pressed, time keeping is started, and the seconds are zeroed prior to the new time keeping procedure. The third display field (minutes/seconds) is available for display, but cannot be set by keyboard entry. Only when a valid four digit hours/minutes entry has been completed by pressing STO is the old seconds erased to zero and new time started. This is to accommodate presetting and display of time prior to a time mark. If an error occurs during any entry sequence, pressing CLR erases the display and starts the sequence over. Pressing TIME repeatedly will cause the display fields to rotate as described above.

h. FILL. This connector is used to fill ECCM parameters from an external fill device. Entry of ECCM parameters is initiated by the LOAD button on the keyboard with the FUNCTION switch in LD. The RT will recognize the attachment of a fill device and respond accordingly.

2.4.1.2 Dedicated Remote RT. The dedicated remote RT is located remotely in the Aircraft equipment bay and operates in conjunction with a console mounted control head (dedicated remote control unit). Due to the remote location of the RT, the radio's front panel is configured with a fill connector (only) as shown in Figure 2.4.1.2-1.

A description of the fill connector given in 2.4.1.1.1h for the panel mounted RT's front panel is applicable to the dedicated remote RT fill connector.

A detailed description of the dedicated remote control unit is presented in paragraph 2.4.2.

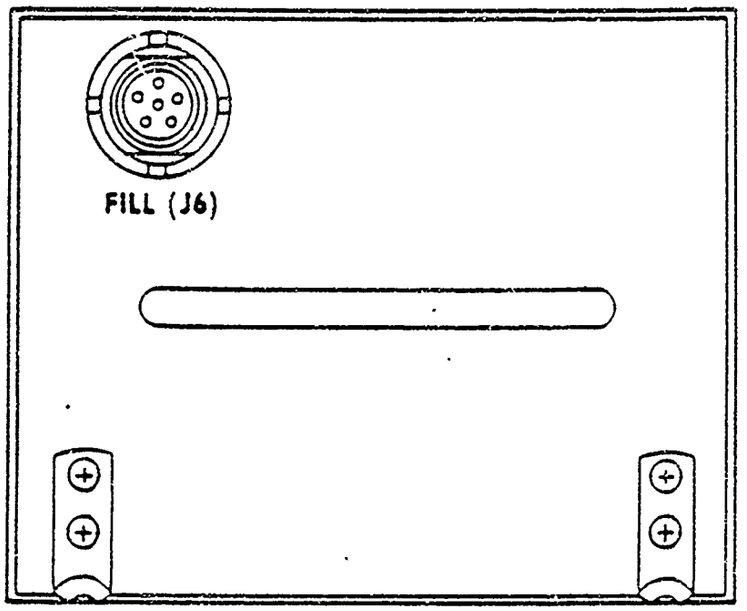


Figure 2.4.1.2-1. Dedicated Remote RT Unit Front Panel

2.4.1.3 1553B Remote RT. The 1553B remote RT is the basic RT with a front panel configured to interface with the 1553B bus controller. Tuning and control information for the RT is transmitted over a dual redundant serial data bus. The 1553B front panel interface accepts the serial data for conversion to an RT compatible format. All RT control functions necessary for radio operation can be processed via the bus link. Refer to "Multiplex Interface Control Document (MIL-STD-1553)" dated 20 March. 1989 and to ITT TP-8144563 for additional information on the RT-1478A.

The front panel interface module contains two PC boards in addition to separate ±10 volt power supplies. The interface module, shown in Figure 2.4.1.3-1, contains four connectors described as follows.

a. Bus A/Bus B - Dual redundant connectors that interface the RT to the 1553 bus controller. These Triax connectors permit the RT to be controlled by the on-board aircraft 1553B bus controller.

b. Address. Provides for an A/C-RT address coding. The associated address plug is used to assign the RT's dedicated address. The appropriate pins are grounded in the plug to establish the address. All other bus traffic which does not contain this address is ignored.

c. FILL - Provides an input port to the RT to permit insertion of fill variables for the ECCM. See paragraph 2.4.1.1.1h for a detailed description of the fill connection function.

2.4.2 Remote Control Unit. The Remote Control Unit (RCU), a panel mounted unit, is shown in Figure 2.4.2-1. The front panel is similar to the panel mounted radio and is within constraints of a three inch panel height. This unit also contains an 1802 based microprocessor system with three LSIs. Two of the LSIs are common to the ground SINCGARS equipment and one LSI is unique to the Aircraft SINCGARS radio. The microprocessor system continually monitors the front panel controls. When a control is changed or a keyboard switch is pressed, serial data is sent to the RT over the RS-449 interface. When the RT responds with a display message, the microprocessor interprets this data and sends it to the LCD display.

The RS-449 interface consists of clock +, clock -, data +, data -, and data direction signals. The data and clock signals are sent over these lines at a 640-Hz rate. Multiple control units may be used by paralleling these signals. Each control unit (and the panel mounted radio) has a take-control input. This take-control input operates the same as the ARC-186 and ARC-164; that is, whenever a control unit's take-control input line is open, it has control. If the line is grounded, the unit is essentially "off." Because the Aircraft SINCGARS has an electronic display, even when one or more of the control units are not in control, any display information is still presented on all control units simultaneously.

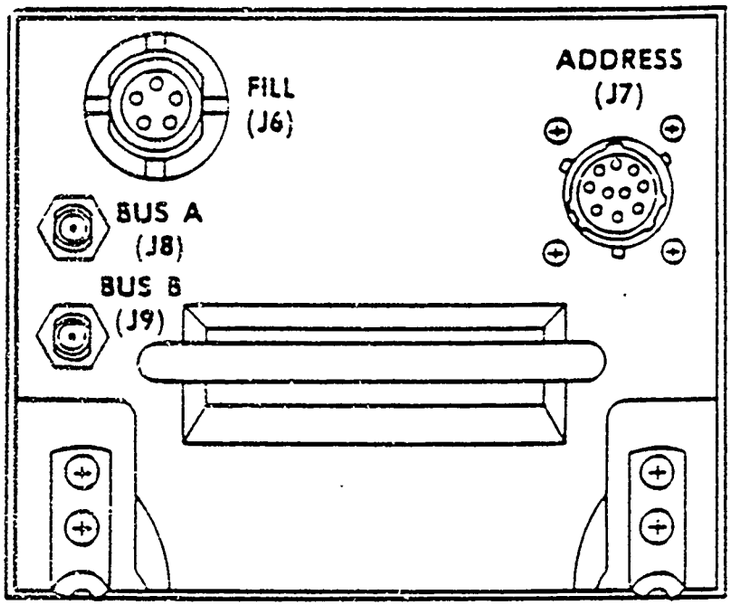


Figure 2.4.1.3-1. 1553B Remote RT Front Panel

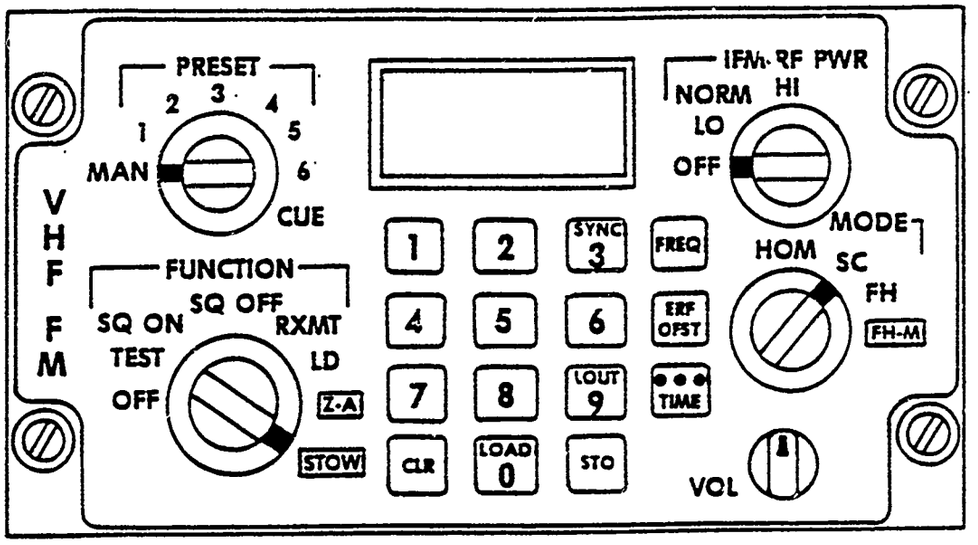


Figure 2.4.2-1. Radio Set C-11466A Front Panel

Audio signals are routed, essentially in series, between multiple remote control units from the RT. The volume control of the controlling unit is active. The inactive volume controls do not affect the received signal level.

The front panel switches, keyboard and LCD display are identical with the front panel description of the panel mounted radio (paragraph 2.4.1.1) and, as such, will not be repeated here.

2.4.3 Signal Data Converter. The Signal Data Converter (SDC) provides the interface of the Intercom, DMD, and TACFIRE Equipment with the Aircraft SINCGARS Radio. The SDC provides the appropriate control signals to allow for various plain text and cypher text modes of operation. It provides for conversion of FSK analog data to 16 Kbps digital data in transmit modes. In receive modes, the SDC provides for conversion of 16 Kbps digital data to FSK tones; 7 out of 13 error correction is also provided. An analog voice mode to and from the aircraft intercom is also processed by the SDC.

The SDC is designed to interface future aircraft data devices operating at variable data rates through the addition of a rear panel switch. Data devices transmitting/receiving at bit rates of 600, 1200, 2400, 4800, and 16000 bps will be converted to the required SINCGARS RT data format in the RT transmit mode and recovered from the same data format in the RT receive operation.

The Signal Data Converter is shown in Figure 2.4.3-1.. It has a backlit NVG Generation III ANVIS compatible panel with an Audio/Fill connector, a volume potentiometer, two switches and a compartment to hold a Hold-Up Battery (HUB). The switches are described as follows:

1. MODE Switch - The SDC provides for control of the RT to establish the correct operating mode, digital or analog, in both receive and transmit modes. It is used to select Plain Text (PT), Cipher Text (CT), Time Delay (TD), and Remote Variable (RV) modes as well as OFF, TEST, and LD. The LD position is used when loading COMSEC variables. TEST is used to perform Built-In-Test (BIT) on the unit. The OFF position powers down the unit with the exception of memory circuits which are kept active by the HUB. Note that the PT and TEST positions are "pull-to-turn" positions.

2. VARiable Switch - This switch is used to select the appropriate variable 1-6. Position 7 "Z" is a "pull-to-turn" position which is used to zero COMSEC variables in all 6 presets.

3. CT VOL Control - The CT VOL (volume) control is a potentiometer which is used to vary the Cipher Text (CT) receive audio volume to a comfortable level consistent with the operator's environment.

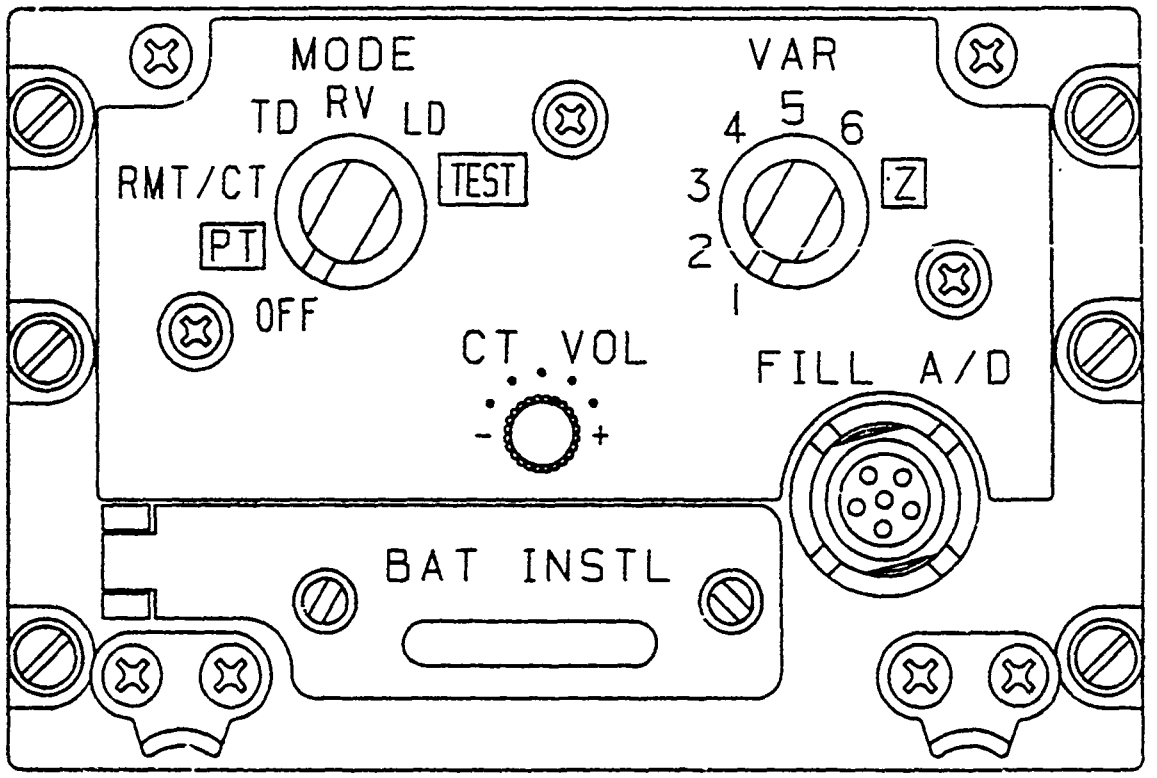


Figure 2.4.3-1. SDC Front Panel

4 Fill A/D Connector - This connector is used to attach a KYK-13 or similar approved Fill Device to the SDC to load the COMSEC variables. It also provides the Audio and digital interface to handsets and digital devices without the use of the intercom.

2.4.4 SDC Rear Panel Switches. The rear panel of the Signal Data Converter contains two switches: a data RATE switch and an "*" switch. The data RATE switch is a rotary switch which allows selection of data rates from 600 to 4800 bps to be interleaved to 16 kbps. The option for AD1 and TF (AD2) are also contained on the data rate switch. The "*" switch is also located on the rear panel of the SDC. The switch is an on/off switch but due to the classified nature of the function it will not be discussed in this document. The correct position for testing will be included in the testing section of this document.

2.5 Self Test Description. To determine operation of the ECCM module and to test operation of the Aircraft Radio Subsystem (ECCM installed). proceed as follows:

1	FUNCTION Switch	- Test	
2	MODE Switch	- Any position	may be set before or after FUNCTION switch is turned to TEST
3	PRESET Switch	- Any position	
	- RF Pwr	- As required	
	- VOL	- As required	

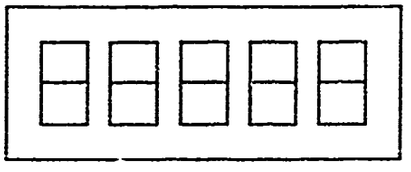
4 | - | - | - | - | - |

No keyboard entry is required. The display will show 5 dashes for approximately one second (as shown in step 4).

5 | E | | | | - |

No keyboard entry is required. The display indicates "E" if ECCM is present (a dash in the same position if absent). In any case, the dispiay is on for 3 seconds before progressing to automatic test steps. This is to allow time for an operator to move the switch to other positions if a complete test sequence is not desired.

6 After 3 seconds the display automatically changes to:



This will test the operation of all segments of all digits of the display. The display will remain on for 3 seconds and extinguish with the RT progressing to the next automatic test step.

7 In the next auto test steps the operation of the RT, the Data Module, and the ECCM are verified (in this order). All tests are under microprocessor control and require no additional operator action. Successful completion of all tests will be indicated by:

G	O	O	D	

"Good" will remain on for 5 seconds and extinguish. The RT will then be left in the receive mode as indicated by the KEYBOARD, MODE, or PRESET switches. Transmitter keying is inhibited. Tests may be repeated by moving the FUNCTION switch out of the TEST position and back again.

8 · Failures in the automatic tests will be indicated by the word FAIL followed by a number to indicate the failed component.

The control panel tests its own internal circuitry and the interface to the RT before commanding the RT test.

F	A	I	L	7

Indicates failures of the interface to the RT

F	A	I	L	8

Indicates internal failure of the control panel

F	A	I	L	1

Indicates failure of the RT RF receive path

F	A	I	L	3

Indicates failure of the ECCM module

When a failure occurs, the display is immediately presented for 3 seconds. After 3 seconds (plus a .5 second delay), the 3 tests are caused to continue. The tests will be continually repeated until terminated by

changing the FUNCTION switch position. If several tests are failed, the display will alternately present the results at each failed component.

NOTE: Some specific tests are performed in any operational position on a continuous basis with the results of this test either audible or visible. These tests are not specifically associated with the TEST portion of the FUNCTION switch.

9 VSWR Test: This test is performed each time the transmitter is keyed and during the transmission. If VSWR exceeds 5:1, the audio sidetone will be inhibited.

10 ECCM: When the PRESET switch position is changed while operating in a frequency hopping mode, the fill data is examined and either "FXXX" if a valid hopset has been loaded or "FILLN" if no hopset will be displayed. BIT is also run on the non-volatile RAM in the ZA switch position. If FH or FH-M is selected without an ECCM module present, "Error" will be displayed.

11 SDC Built-In-Test (BIT): The SDC includes a Built-In-Test (BIT) function. The test function occurs automatically during power up and whenever the unit is placed in 'TEST' mode. Three beeps shall be given if the SDC passes BIT, and in case of failure, a 500 Hz tone shall be output to the intercom and Fill A/D connector. The 500 Hz tone shall be continuous until the operator sends a PTT signal, at which time the unit shall return to operational mode with the fault.

3.0 REQUIREMENTS

3.1 General.

3.1.1 Acceptance. Any installation of the AN/ARC-201A(V) subsystem, which is in accordance with MIL-I-8700 and the requirements of this specification, shall be considered acceptable. Such acceptance, however, does not constitute safety of-flight approval.

3.1.2 Responsibility for Miscellaneous Components. The contractor shall furnish and install all required plugs, cables, connectors, junction boxes, terminal boards, circuit breakers, switches, relays, wiring, mounting hardware, RF filters, impedance matching networks, and miscellaneous items to complete satisfactory installation and operation of the AN/ARC-201A(V) aircraft subsystem. All contractor furnished electronic equipment shall be in accordance with the applicable electromagnetic interference and compatibility requirements in MIL-STD-461 and the requirements in MIL-E-5400 for Class IA equipment designed for operation in both fixed wing aircraft and helicopters.

3.1.3 Quality Assurance. The contractor shall perform all examinations and tests specified in Section 4 to ensure compliance with the applicable requirements of Section 3.

3.1.4 Reports. The contractor shall prepare and submit to the procuring activity all reports and other supplementary data as specified by the contracting officer.

3.1.5 Radio Frequency Assignment. If required, the contractor shall request from the procuring activity a radio frequency assignment for which he has no assignment and is otherwise necessary to verify that the AN/ARC-201A(V) performance is in accordance with the requirements specified herein. Receipt of radio frequency assignments from the procuring activity does not relieve the contractor of any responsibility for obtaining a Federal Communications license to operate equipment radiating electromagnetic energy.

3.1.6 Check-off List. The contractor shall record the results of the applicable examinations and tests specified in Section 4 on a check-off list similar to that shown in Figure 3.1.6-1. The contractor shall prepare a check-off list for each AN/ARC-201A(V) installed in an aircraft and maintain a file of these records for reference, as necessary, by the procuring activity.

3.1.7 Equipment Non-Compliance. Except as specified in paragraph 3.1.8, if the equipment fails to comply with the requirements of paragraph 4.4, the requirements and procedures specified in MIL-I-8700 shall govern with the exception that replacement of component parts shall be made only upon specific written approval by the procuring activity. The applicable "Quality Deficiency Report" shall be utilized when reporting equipment failure. Shipping instructions for the faulty equipment and distribution requirements for the equipment failure report shall be specified by the contracting officer.

Check-Off List for Test of AN/ARC-201A(V) Aircraft Subsystem

Serial No. _____

Tests Conducted by: _____ Date: _____

Bench Tests

Applicable Paragraph	Tests	Minimum Standards	Test Data	Remarks
4.4.3.2	Power on - self confidence tests	Display of "Good"	Check Compliance _____	
4.4.3.3	Control/programming tests	A number of display presentations (Note any errors)	_____	
4.4.3.4	Transmitter tests			
4.4.3.4.1	Power output and sidetone tests	Sidetone present at each frequency and 10 watts +5.8, -3.7W at:	_____	
f		30.000 MHz	_____	
h		37.875 MHz	_____	
h		42.975 MHz	_____	
h		45.375 MHz	_____	
h		49.075 MHz	_____	
h		56.200 MHz	_____	
h		68.750 MHz	_____	
h		87.975 MHz	_____	
4.4.3.4.2f	Frequency check	29,999,550-30,000,450 Hz	_____	
		37,874,432-37,875,568 Hz	_____	
g		42,974,355-42,975,645 Hz	_____	
g		45,374,319-45,375,681 Hz	_____	
g		49,074,264-49,075,736 Hz	_____	
g		56,199,157-56,200,843 Hz	_____	
g		68,773,968-68,776,032 Hz	_____	
g		87,973,681-87,976,319Hz	_____	

Figure 3.1.6-1. Check-Off List for Bench Tests (Sheet 1 of 4)

Check-Off List for Test of AN/ARC-201A(V) Aircraft Subsystem

Serial No. _____

Tests Conducted by: _____ Date: _____

Bench Tests

Applicable Paragraph	Tests	Minimum Standards	Test Data	Remarks
4.4.3.4.3g	Transmitter Carrier	16-22 kHz p-p @ 30.000 MHz	_____	
i	Deviaiton Tests	16-22 kHz p-p @ 37.875 MHz	_____	
j		16-22 kHz p-p @ 42.975 MHz	_____	
		16-22 kHz p-p @ 45.375 MHz	_____	
		16-22 kHz p-p @ 49.075 MHz	_____	
		16-22 kHz p-p @ 56.200 MHz	_____	
		16-22 kHz p-p @ 68.775 MHz	_____	
		16-22 kHz p-p @ 87.975 MHz	_____	
4.4.3.5	Receiver Test			
4.4.3.5.1	Analog Sensitivity			
h		≤-105 dBm at 30 MHz	_____	
i		≤-105 dBm at 37.875 MHz	_____	
i		≤-105 dBm at 42.975 MHz	_____	
i		≤-105 dBm at 45.375 MHz	_____	
i		≤-105 dBm at 49.075 MHz	_____	
i		≤-105 dBm at 56.2 MHz	_____	
i		≤-105 dBm at 68.775 MHz	_____	
i		≤-105 dBm at 87.975 MHz	_____	
4.4.3.5.2	Squelch and volume control tests	30 MHz		
i		30 MHz Squelch break point	_____	
j		Squelch return point	_____	
k				
l		Squelch threshold point ≤-115 dBm	_____	
m		56.2 MHz squelch break	_____	
o		Volume Control range (dB)		

Figure 3.1.6-1. Check-Off List for Bench Tests (Sheet 2 of 4)

Check-Off List for Test of AN/ARC-201A(V) Aircraft Subsystem

Serial No. _____

Tests Conducted by: _____ Date: _____

Bench Tests

Applicable Paragraph	Tests	Minimum Standards	Test Data	Remarks
4.4.3.6	Homing tests			
e		Flags solid color at -93 dBm max (RT)	_____	
f		meter positioned at bottom	_____	
h		indicator to right	_____	
j		indicator to left	_____	
4.4.3.7	IFM amplifier tests			
f		Sidetone present	_____	
h		No sidetone	_____	
j		TPs 1,2,3 Hi; 4,5 Lo	_____	
k		TPs 1,2,3,5 Hi; 4 Lo	_____	
l		TPs 1,3,5 Hi; 2,4 Lo	_____	
m		TPs 3,5 Hi; 1,2,4 Lo	_____	
n		TPs 2,3,5 Hi; 1,4 Lo	_____	
o		TPs 2,5 Hi; 1,3,4 Lo	_____	
p		TPs 2,3,4,5 Hi; 1 Lo	_____	
4.4.3.8.1	Single channel tests (PT voice)			
d		Half duplex communication possible	_____	
4.4.3.8.2				
f	SC FSK Test	Wave Form at 30.000 MHz	_____	
l		Wave Form at 87.475 MHz	_____	
4.4.3.9	FH tests (PT voice)			
d		Half duplex communication possible	_____	

Figure 3.1.6-1. Check-Off List for Bench Tests (Sheet 3 of 4)

Check-Off List for Test of AN/ARC-201A(V) Aircraft Subsystem

Serial No. _____

Tests Conducted by: _____ Date: _____

Bench Tests

Applicable Paragraph		Tests	Minimum Standards	Test Data	Remarks
4.5.1		Preflight Tests	Electrical Power Voltage	_____	
4.5.3	d	Receiver Tests	Communication @ 30.000 MHz	_____	
	e		Communication @ 37.875 MHz	_____	
	e		Communication @ 42.975 MHz	_____	
	e		Communication @ 45.375 MHz	_____	
	e		Communication @ 49.075 MHz	_____	
	e		Communication @ 56.200 MHz	_____	
	e		Communication @ 68.775 MHz	_____	
	e		Communication @ 87.975 MHz	_____	
4.4.4.1	d	XMT Forward/Ref/Pwr	10W +5.8, -3.7 Watts	_____	
	e		4.4W Max. at 5:1 VSWR	_____	
4.5.5.1		SC Radio Perform.	Communication Established	_____	
4.5.6	d	Retransmission Check	Communications Established	_____	
4.5.7	d	Homing Tests	Homing Indicators Activated	_____	
4.6.1		Communication Test	Squelch Action Adequate at 3 Frequencies	_____	
			Sidetone Adequate at 3 Frequencies	_____	
4.6.2		Homing Tests	Homing Indicators Activated	_____	

Figure 3.1.6-1. Check-Off List for Bench Tests (Sheet 4 of 4)

3.1.8 Equipment Under Warranty. The equipment repair procedures specified in MIL-I-8700 are not authorized for Government furnished equipment which is under warranty by the equipment manufacturer Disposition and reporting of faulty equipment shall be as specified in paragraph 3.1.7.

3.1.9 Procuring Activity Approval. In all cases where approval by the procuring activity is specified, the contractor shall be in receipt of said approval prior to conducting any tests, inspections, or otherwise utilizing the proposed equipment or procedures.

3.1.10 Test Equipment Calibration. The contractor shall prepare a statement which identifies the test equipment utilized in the performance of the tests specified in Section 4. The statement shall include certification of the test equipment calibration in accordance with MIL-C-45662 and be forwarded to the procuring activity as supplementary data to the applicable test report.

3.1.11 Electronic Subsystem Certification. The contractor shall prepare a statement which certifies that all aircraft installed electronic subsystems which are utilized in the performance of the tests specified in Section 4 are in accordance with the applicable specifications. The statement shall be forwarded to the procuring activity as supplementary data to the applicable test reports.

3.1.12 Instrumentation. The instrumentation system application and techniques utilized to collect the engineering flight test data shall be fully disclosed and forwarded to the procuring activity as supplementary data to the applicable test report. The range and accuracy (including transducer and printout errors) of each recorded signal shall be adequate for comprehensive evaluation of the parameter(s) being measured. The supplementary data shall include but not be limited to the following:

a. Recording media (block diagram including component identification numbers)

b. Transducer and/or signal source parameters.

c. Signal conditioning for each signal (schematic).

d. Preflight and post-flight calibration techniques.

e. Calibration test equipment list with calibration certification.

f. Instrumentation system range and accuracy certification for each recorded signal.

g. Calibration curves necessary for complete analysis of each recorded signal.

h. Other data required.

3.1.13 Electromagnetic Compatibility. Electromagnetic compatibility and test plans shall be prepared by the contractor in accordance with MIL-STD-6051 and submitted to the procuring activity for approval.

The contractor shall install the AN/ARC-201A(V) in accordance with the electromagnetic compatibility control and test requirements specified in the contract.

The AN/ARC-201A(V) Aircraft subsystem EMI characteristics are listed in Section 3.2.12. An EMI test report shall be forwarded to the procuring activity as directed by the contracting officer.

3.1.13.1 Critical Frequencies. There are a number of frequencies considered critical to the operation of the AN/ARC-201A(V) subsystem which may require special consideration during Electromagnetic compatibility testing. These frequencies are generated directly within the equipment as clocks or are the result of multiplication, division, filtering, mixing, or otherwise handling of the digital and analog signals within the equipment. Following is a list of these frequencies. Although specific operating frequencies only are listed, any of the harmonics and subharmonics as well as mixing products in particular combinations should be investigated if problems involving pickup, radiation, and interference occur during EMC tests.

640	Hz	Data transfer for remote control
16	kHz	Data rate for communication
20	kHz	ECCM data rate
40	kHz	Data transfer from front panel to display
120	kHz	SDC power supply switching rate
160	kHz	RT power supply switching rate
240	kHz	Front panel timing pulse rate, SDC Power Supply sync pulse.
320	kHz	Clock for data and tuner control and antenna tune
640	kHz	Microprocessor clock, SDC COMSEC Module Clock
1.92	MHz	Clocks in SDC, RCU and front panel
2.133	MHz	ECCM clock
3.2	MHz	Synthesizer clock and RT-1478A clock
3.9	MHz	Power amplifier clock
16	MHz	Data clock in RT-1478A

In addition, the IF frequency is 12.5 MHz with the local oscillator (LO) above the tune frequency. Any RF spaced 12.5 MHz from the LO might cause receive signal degradation.

3.1.14 Equipment Components. A brief description of the AN/ARC-201A(V) Aircraft system and its capability is included in sections 2.4 and 2.5 of this specification. The components of the Aircraft subsystem AN/ARC-201A(V) to be tested are listed in Table 3.1.14-1.

Table 3.1.14-1. Equipment to Be Tested for AN/ARC-201A(V) Aircraft System

Equipment Designation	Part Number or Nomenclature	Wgt. Per Unit (pounds)	Maximum Unit Power Consumption at 27.5 Vdc	Remarks
Panel Mounted RT	RT-1476A/ARC-201A	9.0	22W(R) 105W(T)	
Dedicated Remote RT	RT-1477A/ARC-201A	10.0	22W(R) 105W(T)	
Remote Control Unit for RT-1477A/ARC-201A	C-11466A/ARC-201A	4.0	1.4W	Can also be used with RT-1476A
MIL-STD-1553B RT	RT-1478A/ARC-201A	10.0	25W(R) 107W(T)	
Mounting Base	MT-6363/ARC-201	2.5	N/A	
Hard Mount	MT-6374/ARC-201	2.5	N/A	
Signal Data Converter	CV-4122(C)/ARC-201A	6.5	20W	
SDC Hard Mount	MT-6709/ARC-201A	2.8	N/A	
SDC Adapter Tray	MT-6710/ARC-201A	2.5	N/A	

3.1.15 Additional Equipment Required. In addition to the equipment listed in Table III, the equipment listed below is required for the various configurations of the aircraft subsystems (AN/ARC-201A).

For Panel Mounted RT (RT-1476A)

Depending upon desired mission and operational configuration, the following auxiliary equipment may be interfaced with the panel mounted RT.

- Remote control unit (C-11466A)
- Power amplifier IFM (AM-7189A)
- Two homing antennas
- Communication antenna
- COMSEC VINSON (KY-58)
- COMSEC applique Z-AHQ
- Data rate adapter (CV-3885)
- Homing indicator (ID-1351A)
- COMSEC remote control (Z-AHP)
- A/C intercom sets (C-6533, C-10414, C-1611)
- A/C headset (H-157/AIC or H-101/AIC)
- Digital message device (AN/PSG-2), TACFIRE
- Take control switch (Aircraft cockpit mounted)
- Airborne Target Handoff System (ATHS)
- Signal Data Converter (CV-4122)

For Dedicated Remote RT (RT-1477A)

Depending upon mission and operational configuration, the following auxiliary equipment may be interfaced with the dedicated RT.

- Power amplifier IFM (AM-7189A)
- Two homing antennas
- Communication antennas
- Homing indicator (ID-1351A)
- Data rate adapter (CV-3885)
- COMSEC VINSON (KY-58)
- COMSEC applique Z-AHQ
- COMSEC remote control Z-AHP
- A/C intercom (C-6533, C10414, C-1611)
- A/C headset (H-157/AIC or H-101/AIC)
- Take control switch
- Airborne Target Handoff System (ATHS)
- Adapter tray MT-6373/ARC-201
- Digital message device (AN/PSG-2), TACFIRE
- Hard Mount MT-6374/ARC-201
- Mounting Base MT-3664/ARC-131
- Signal Data Converter (CV-4122)
- Adapter Tray (SDC) (MT-6710)
- Hard Mount (SDC) (MT-6709)

For 1553B RT (RT-1478A)

The following auxiliary equipment may be interfaced with the 1553B RT as required by mission:

- Power amplifier IFM (AM-7189A)
- Two homing antennas
- Communication antennas
- Data rate adapter (CV-3885)
- Homing indicator (ID-1351A)
- COMSEC VINSON (KY-58)
- COMSEC applique Z-AHQ
- COMSEC remote control Z-AHP
- A/C intercom (C-6533, C-10414, C-1611)
- A/C headset (H-157/AIC or H-101/AIC)
- Digital message device (AN/PSG-2), TACFIRE
- Hard mount MT-6374/ARC-201
- Airborne Target Handoff System (ATHS)
- Integrated Control/Display System
- Signal Data Converter (CV-4122)
- Hard Mount (SDC) (MT-6709)

3.1.16 Test Equipment Required. The test equipment in Table 3.1.16-1 or equipment of equal or superior characteristics, shall be used in the performance of the tests specified herein. Items which are considered unique to the equipment under test and which may be loaned to the contractor by the procuring activity are marked with an asterisk.

Table 3.1.16-1. Test Equipment and Accessories

QTY	NAME	NOMENCLATURE
1	Wattmeter	Wattmeter AN/URM-120 or BIRD 4381
1	FM Generator SG-1112(V)1/U	Signal Generator HP-8640B
2	Function Generator SG-1131/U	Signal Generator HP-3312A
1	Modulation Analyzer	HP 8901B
1	Frequency Counter TD-1225(V)1/U	Electrical Counter HP-5340A
1	RF Voltmeter	Boonton 92B
2	Headset	H157/AIC or H-101/AIC
1	Voltmeter	HP 3400A
1	Kit	Test Facilities Kit MK-994/AR
2	Intercom	C-6533
1	Audio Analyzer	HP 8903A
1	MIL-STD-1553* Data Bus Exerciser	CDS (Colorado Data Systems) 63AIBX (or) Loral SBA100F
2	Attenuator 30 dB	Weinschel 24-30-34
1	Attenuator, 6 dB	HP-8391A-006
2	20 dB Attenuator	Weinchel 24-20-34
2	Power Supply	HP-6434B
1	Multimeter AN/USM-486/U	Multimeter Fluke 8050-01
1	Tape Reader (w/Test Tapes)	KOI-18/TSEC

Other items may be supplied in special circumstances, but in all cases such circumstances must be justified by the contractor and approved by the procuring activity.

3.2 Installation. All government furnished electronic equipment and contractor furnished electronic equipment shall be installed in accordance with MIL-I-8700 and as specified herein.

3.2.1 General. All electrical wiring required for installation of AN/ARC-201A(V) Aircraft system shall be in accordance with MIL-W-5088 and as specified herein. Refer to Figures 17 through 23.

a. Avoid sharp bends in all cables where possible.

b. Avoid running any cables carrying signals in the same ducts carrying rf power and aircraft power: in particular 115 volts, 400 Hz.

c. Extreme care must be taken to prevent entrance of non-contained fuel, oil, or other foreign substances into the compartments in which the equipment is installed.

d. Do not disconnect or connect any connector to remove or replace any component when power is applied to the equipment.

e. Cable lengths and plug requirements are determined by particular installation. Cables and connectors are not supplied with the equipment. Use RG-214/U, RG142B/U or RG236/U cable. Cable loss shall not exceed 0.5 dB. Total cable length for the RF path shall not exceed 50 feet. Note - 50 feet at 0.5 dB maximum would require use of RG236/U cable. (Total cable length in inches, including connector lengths, shall be determined in order that a zero calibration cable can be fabricated for use in bench checks.)

f. When fabricating RF cables, use extreme care to avoid introducing a high voltage-standing-wave ratio. The RF cables are used to interconnect the receiver-transmitter and the antennas. Each coaxial cable shall be checked according to paragraph 3.2.6.1 prior to installation in the aircraft. Every effort should be used to minimize breaks in the RF cables. All bulkhead breaks in RF cables shall be safety wired in accordance with MIL-W-5088.

3.2.2 Electrical Bonding. Electrical bonding shall be in accordance with MIL-B-5087 and as specified herein. Refinishing of bonded surfaces shall be in accordance with the applicable requirements of MIL-F-14072.

3.2.3 Antennas. Installation, design, and location of aircraft antennas shall be in accordance with MIL-STD-877 and as specified herein.

3.2.4 Control Panels. All contractor furnished rack or console mounted control panels shall be in accordance with MIL-C-6781 and as specified herein.

3.2.5 Mountings. All contractor furnished cases, mounting bases and vibration mounts shall be in accordance with MIL-C-172 except that the transmissibility in each of the three mutually perpendicular principal axes of the mounting base shall not exceed three (3) g's.

3.2.6 Precautions.

3.2.6.1 Voltage-Standing-Wave Ratio (VSWR) and Continuity Checks. Before connecting the cables to the equipment, conduct the following checks:

a. Check the interconnecting coaxial cables for VSWR using a single-channel insertion loss test set having an RF generator, standing-wave bridge, indicator, and a suitable 50-ohm resistive termination. The RF generator shall be able to provide an output frequency of 88 MHz. The VSWR at 88 MHz shall be 1.2:1 or less. Total loss in the cables shall not exceed 0.5 dB. Total leakage between cables shall not exceed -90 dB. Dc electrical continuity between inner conductors shall be verified.

3.2.7 Power Supply Requirements

a. The aircraft RT units and SDC shall operate under all environmental conditions over the supply voltage range of 24 to 29 Vdc and a nominal voltage at 27.5 Vdc.

b. For a supply voltage of 21 Vdc, the aircraft RT shall be capable of delivering a minimum of 4 watts of RF power to a 50 ohm load and in addition there shall be no degradation to receiver performance.

c. For supply voltages of 17 Vdc and 30 Vdc, circuit damage to the RT units and SDC shall not occur in this condition; further, reverse voltage and transient protection shall be provided as defined in MIL-STD-704, category B.

3.2.8 Normal Duty Cycle. For purposes of this specification, normal duty cycle is one minute transmit, five minutes receive.

3.2.9 Environmental Requirements. The AN/ARC-201A(V) complies with the environmental requirements specified below and shall be installed to operate within these limits.

Temperature-Altitude	MIL-E-5400/Class 1A
Humidity	MIL-STD-810D Procedure II, Cycle 4
Shock (g's; duration)	MIL-STD-810C
Vibration:	As specified in applicable Product Specification CDRL 3170B005

Rain	2 inches per hour on front panels of the normally mounted RT remote control unit and SDC
Fungus	MIL-STD-810C
Sand and Dust	MIL-STD-810C
Salt Atmosphere	MIL-STD-810C
Nuclear Survivability	(Refer to Sections 2.2.2 and 2.2.2.1)

3.2.10 Pressurization. - (none required)

3.2.11 Cooling. - (none required)

3.2.12 Electromagnetic Interference (EMI) Characteristics. The Aircraft SINCGARS equipment shall be designed to comply with the emission and susceptibility requirements of MIL-STD-461, when tested with the methods, procedures, and requirements of MIL-STD-462, listed below:

CE01	(c) CS01	(e) RE02	RS02
CE02	CS02		(f) RS03
CE03	CS03		RS03.1
(a) CE05	(d) CS04		
(b) CE06	CS06		

a. 20 dB relaxation from [illegible] MHz to 10 MHz.

b. Spurious emissions shall be -100 dB relative to the fundamental frequency power level, except (5) emissions shall be permitted to be -87 dB. Harmonic emissions shall be per MIL-STD-461, except that the harmonics $\leq$ the 3rd shall be $\geq$ 60 dBc and harmonics > 3rd will be $\geq$ 80 dBc. Local Oscillator harmonics shall be below the limits of MIL-STD-461 except for a maximum of three harmonics which shall be $\leq$ 15 dB above the MIL-STD-461 limits, for the homing antennas.

c. Specification limits are reduced from the MIL-STD-461 levels to those of MIL-STD-704 which specifies a maximum ripple voltage of 1.5 volts peak or 1.0 volts RMS.

d. CS04 testing procedure in Single Channel Analog Mode shall consist of adjusting the desired RF signal level 5 dB above that required to obtain a SINAD reading of 10 dB. Failure criteria shall consist of degradation below the 10 dB SINAD level. CS04 testing procedure in Single Channel Homing mode shall consist of adjusting the desired RF level to a level 5 dB above that at which the Signal Adequacy circuits change state. The undesired signal level shall be adjusted to a level 80 dB above the level determined in the Single Channel Analog test which produced a SINAD reading of 10 dB. In the event that a response is detected (the Homing Steering indicator

deviates more than ±1 division), the desired signal level shall be adjusted to a -60 dBm level, and the frequency of the response shall be recorded. Failure criteria shall consist of response > ±1 division at this increased desired signal level.

e. RE02: Narrowband and broadband emissions shall be defined by Figures 2 and 3, except for emissions of the fundamental and its harmonics. The fundamental is exempt and the harmonics shall not exceed limits by more than 10 dB except for three harmonics which shall not exceed the limits by more than 20 dB. In Transmit modes. the harmonics of the operating frequency of the switching power supply ≤1.0 MHz shall not exceed the limits by more than 15 dB.

f. The on-channel signal in all modes shall be increased to -80 dBm when the RS03 source signals (radiated energy) fall on harmonics of the local oscillator plus or minus the IF (intermediate frequency), including the IF itself. A maximum of 5 frequencies are to be allowed which require an on-channel signal of -70 dBm to maintain 10 dB SINAD.

3.2.13 Location Considerations. Every consideration shall be given to the location of equipment and in the design of installation details to promote operator efficiency and ease of adjustment and replacement. These considerations shall not be compromised to facilitate aircraft production techniques. It is especially important that the RT be located and positioned so that access to the FILL connector is maintained or access can be made easily available when required. Refer to appendix B for additional information regarding connections to the FILL connector.

3 2.14 Detailed Requirements.

3.2.14.1 Panel Mounted Receiver-Transmitter, RT-1476A. The Panel Mounted RT is designed to replace the ARC-114. It is controlled by its own local control front panel but may be remotely controlled by the C-11466A Remote control Unit.

3.2.14.2 Dedicated Remote Receiver-Transmitter RT-1477A and Remote Control Unit, C-11466A. The dedicated remote RT and the RCU form a remote control Aircraft radio system. The primary use of this radio is as a replacement for the ARC-131 and it may be mounted on either the ARC-131 adapter tray, MT-6373 or the hard mount, MT-6374.

3.2.14.3 MIL-STD-1553B Receiver-Transmitter, RT-1478A. The MIL-STD-1553B RT is intended for new installations such as the Army Helicopter Improvement Program (AHIP) which features the MIL-STD-1553B bus. It is intended to be hard mounted on the MT-6374.

3.2.14.4 Remote Control Unit, C-11466A. The RCU is always used with the RT-1477A dedicated remote RT and can be used with the RT-1476A panel

mount RT. It is configured to the panel mount in an aircraft cockpit Its front panel is similar to the front panel of the RT-1476A.

3.2.14.5 Signal Data Converter. The SDC can be either panel mounted in the helicopter cockpit or mounted on the SDC Hardmount, MT-6709 in new installations or mounted via the SDC Adapter Tray, MT-6710 to the KY-28 mount (MT-3802) to use existing aircraft wiring in present installations.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the contractor may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of Inspections. The inspections required to ensure conformance with the requirements of this specification are classified as follows:

a. Installation examination (see 4.3)
b. Bench tests (see 4.4)
c. Preflight tests (see 4.5)
d. Flight tests (see 4.6)

4.3 Installation Examination. The AN/ARC-201A(V) and all associated equipment which is installed by the contractor shall be examined to determine compliance with section 3.

4.3.1 Installation Drawings. Installation drawings for the various radio configurations and auxiliary items for the AN/ARC-201A(V) Aircraft system are covered by Figures 4.3.1-1 through 4.3.1-10. Configurations shown are (1) Panel Mounted radio RT-1476A, (2) Dedicated Remote Radio RT-1477A, (3) 1553B Bus Controlled Radio RT-1478A, (4) Remote Control Unit C-11466A, (5) Data Rate Adapter (Panel Mount), (6) Hard Mount MT-6374 with an RT-1477A, (7) Hard Mount MT-6374 with an RT-1478A, and (8) Adapter Tray MT-6373 with an RT-1477A, (9) Signal Data Converter on MT-6709 Hard Mount, (10) Signal Data Converter on MT-6710 Adapter Tray. The installation drawings include outline dimensions, location and identity of controls, weight, location, identity and part numbers of interface connectors, location and size of mounting holes and other pertinent information.

4.3.2 External Wiring Diagrams. The interconnections for six basic radio configurations and the peripheral, auxiliary equipment and/or commonly used optional equipment are shown on Figures 4.3.2-1 through 4.3.2-6. Some of the peripherals shown are part of a normal aircraft complement where interconnections are an integral part of the aircraft wiring.

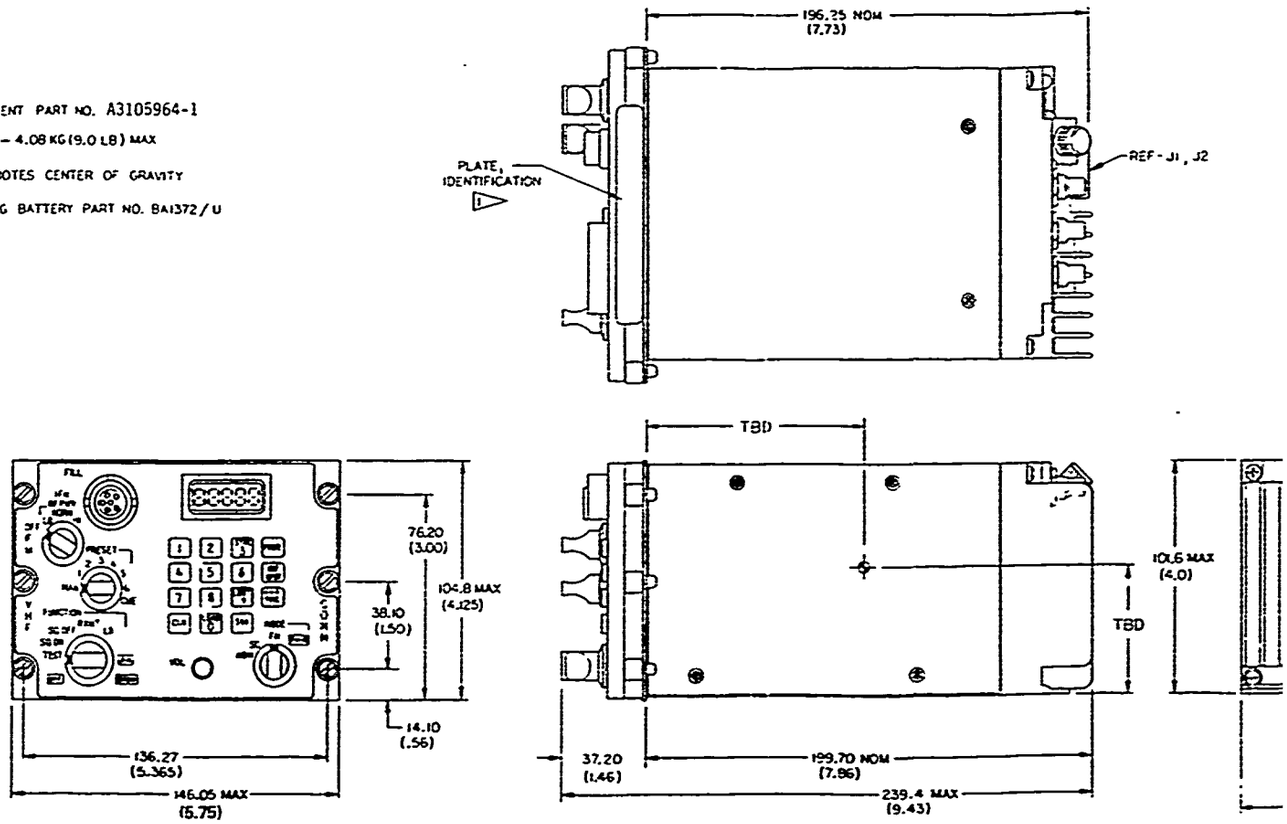
NOTE: The wiring shown is typical and not mandatory. In general, it is for information only. Actual wiring shall comply with MIL-W-5088 with bonding to MIL-B-5087 or as specified herein.

4.4 Bench Tests. Bench tests shall be performed on each AN/ARC-201A(V) prior to installation in an aircraft unless otherwise specified in the contract.

4.4.1 General. A test bench is required, with a Test Facilities Kit MK-994/ARC, or equivalent, cabled to accommodate the units to be tested and

NOTES:

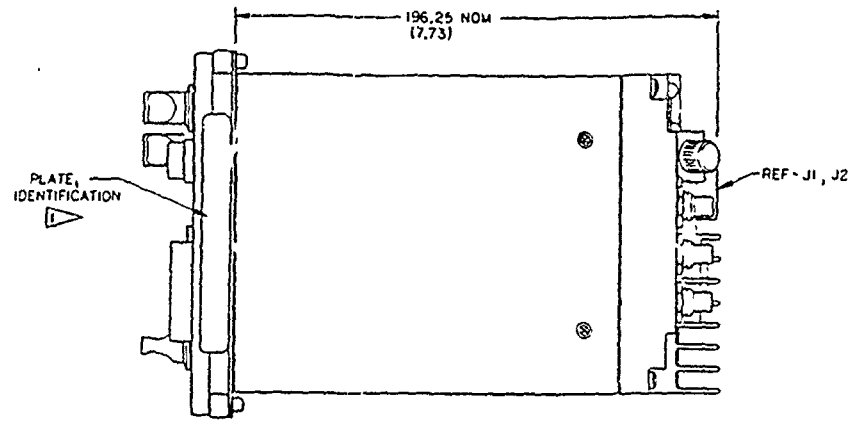
1. EQUIPMENT PART NO. A3105964-1
2. WEIGHT – 4.08 KG (9.0 LB) MAX
3. ⌖ DENOTES CENTER OF GRAVITY
4. HOLDING BATTERY PART NO. BA1372/U

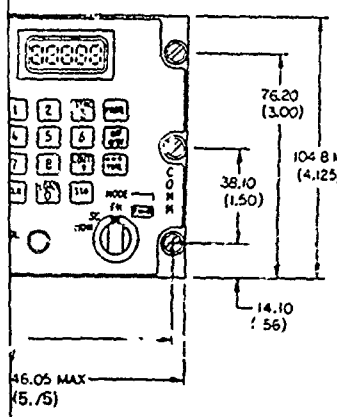


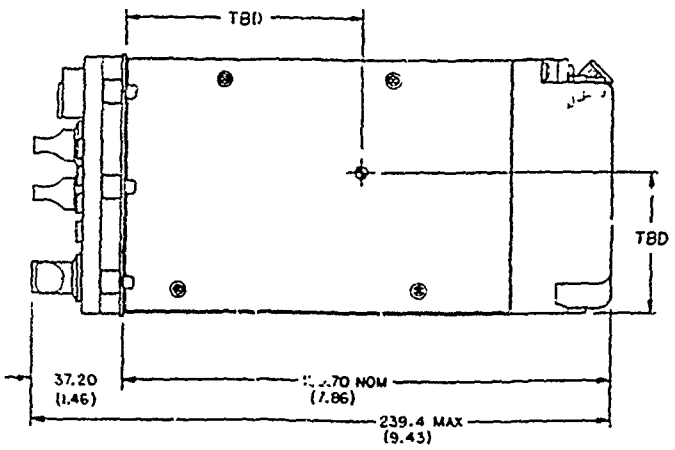
CONN	FUNCTION	MIL OR VENDOR PART NO.	MATING CONN PART NO.
J1	SYSTEM	B4042316-1	MS27484T18F32S
J2	ANCILLARY	B4042316-1	MS27484T16F26P
J3	COM ANT	B4042317-1	UG-1366( )/U
J4	RT HOMING		
J5	LT HOMING		
J6	FILL	A3042761-2	A3042780-1

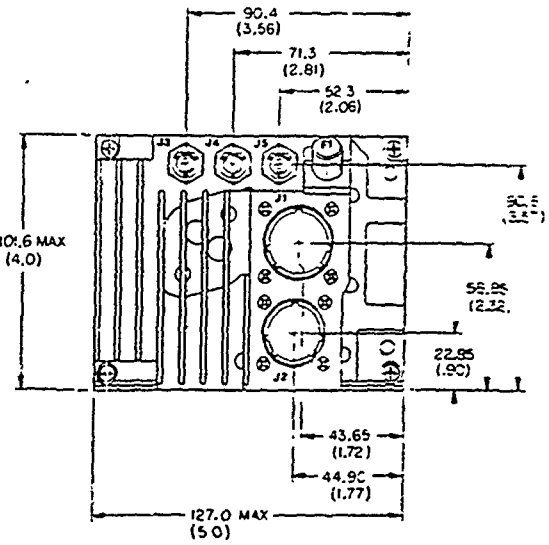
ALL DIMENSIONS IN mm (in)

Figure 4 3 1-1 Installation Control Drawing, Local Control ST-1476A

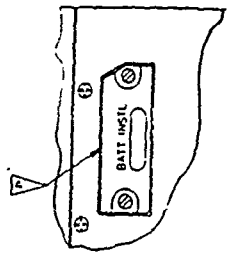








CONN	MATING CONN PART NO
J1	MS27484T18F32S
J2	MS27464T16F26P
J3	UG-1366( )/U
J4	A3012780-1



BOTTOM VIEW

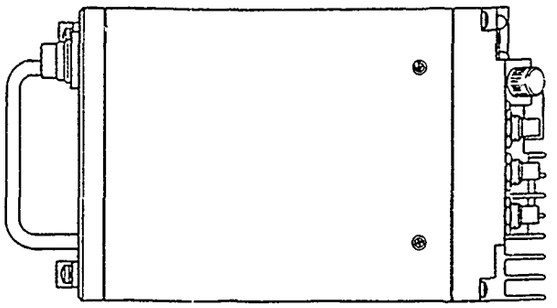
mm (in)

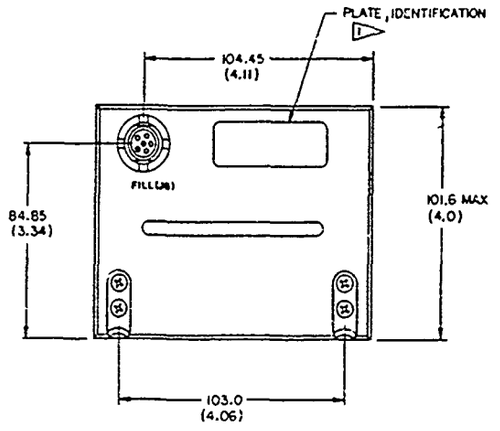
Figure 4 3 1-1 Installation Control Drawing, Local Control RT-1476A

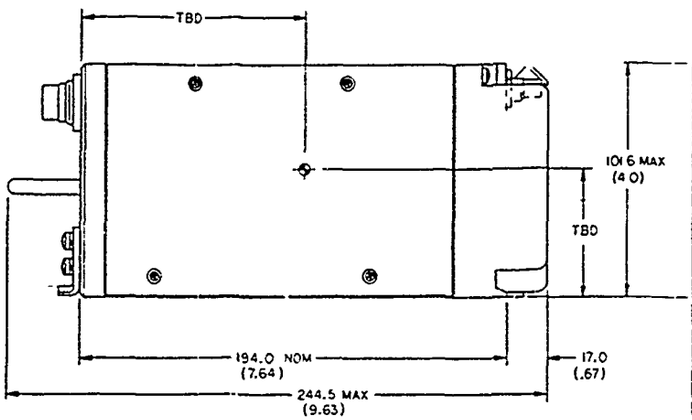
[redacted]

NOTES.

1. EQUIPMENT PART NO A3105965-1
2. WEIGHT - 4.54 KG (10.0 LB) MAX
3. ◈ DENOTES CENTER OF GRAVITY
4. HOLDING BATTERY PART NO. BA1372/U

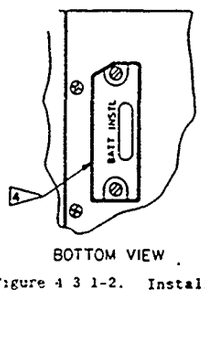






CONN	FUNCTION	MIL OR VENDOR PART NO	MATING CONN PART NO
J1	SYSTEM	84042316-1	MS27484T18F32S
J2	ANCILLARY	84042316-1	MS27484T16F26P
J3	COM ANT	84042317-1	UG-1366(1)/U
J4	RT HOMING		
J5	LT HOMING		
J6	FILL	A3012761-2	A3012780-1

ALL DIMENSIONS IN mm (in)



BOTTOM VIEW

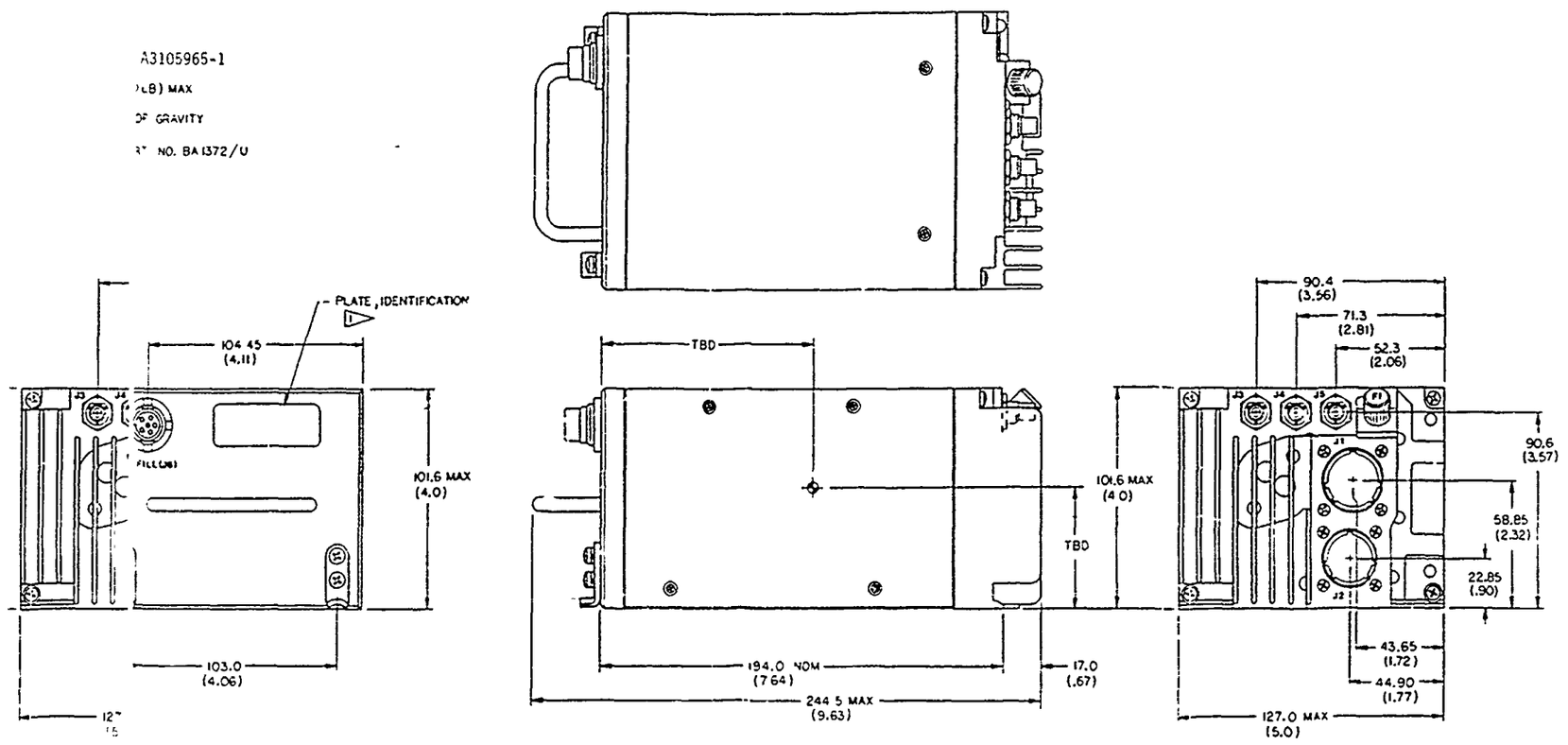
Figure 4 3 1-2. Installation Control Drawing, Dedicated Remote RT-1477A

A3105965-1

)LB) MAX

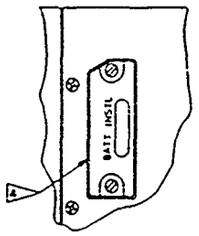
)F GRAVITY

)" NO. BA1372/U



...L OR VENDOR PART NO	MATING CONN PART NO
)4042316-1	MS27484T18F32S
)4042316-1	MS27484T16F26P
)4042317-1	UG-1366( )/U
3012761-2	A3012780-1

IONS IN mm (in)

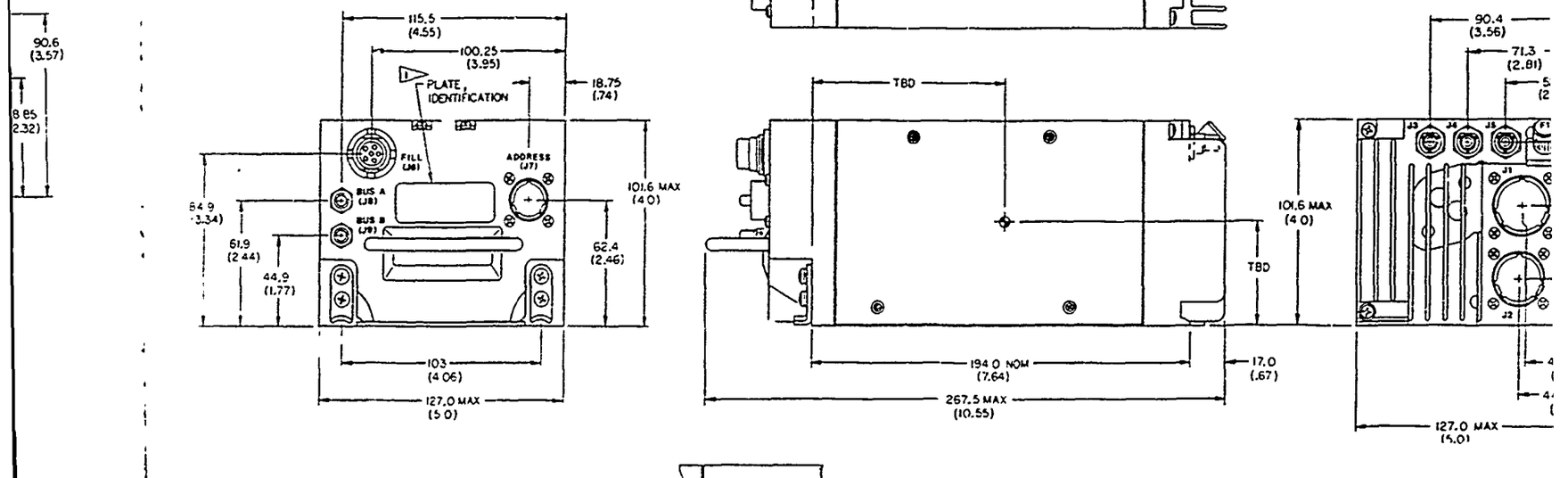


BOTTOM VIEW

Figure 1 3 1-2 Installation Control Drawing, Dedicated Remote RT-1477A

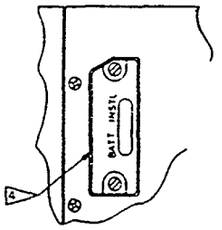
NOTES:

1. EQUIPMENT PART NO. A3105966-1
2. WEIGHT = 4.54 KG (10.0 LB) MAX
3. DENOTES CENTER OF GRAVITY
4. HOLDING BATTERY PART NO. BA1372/U



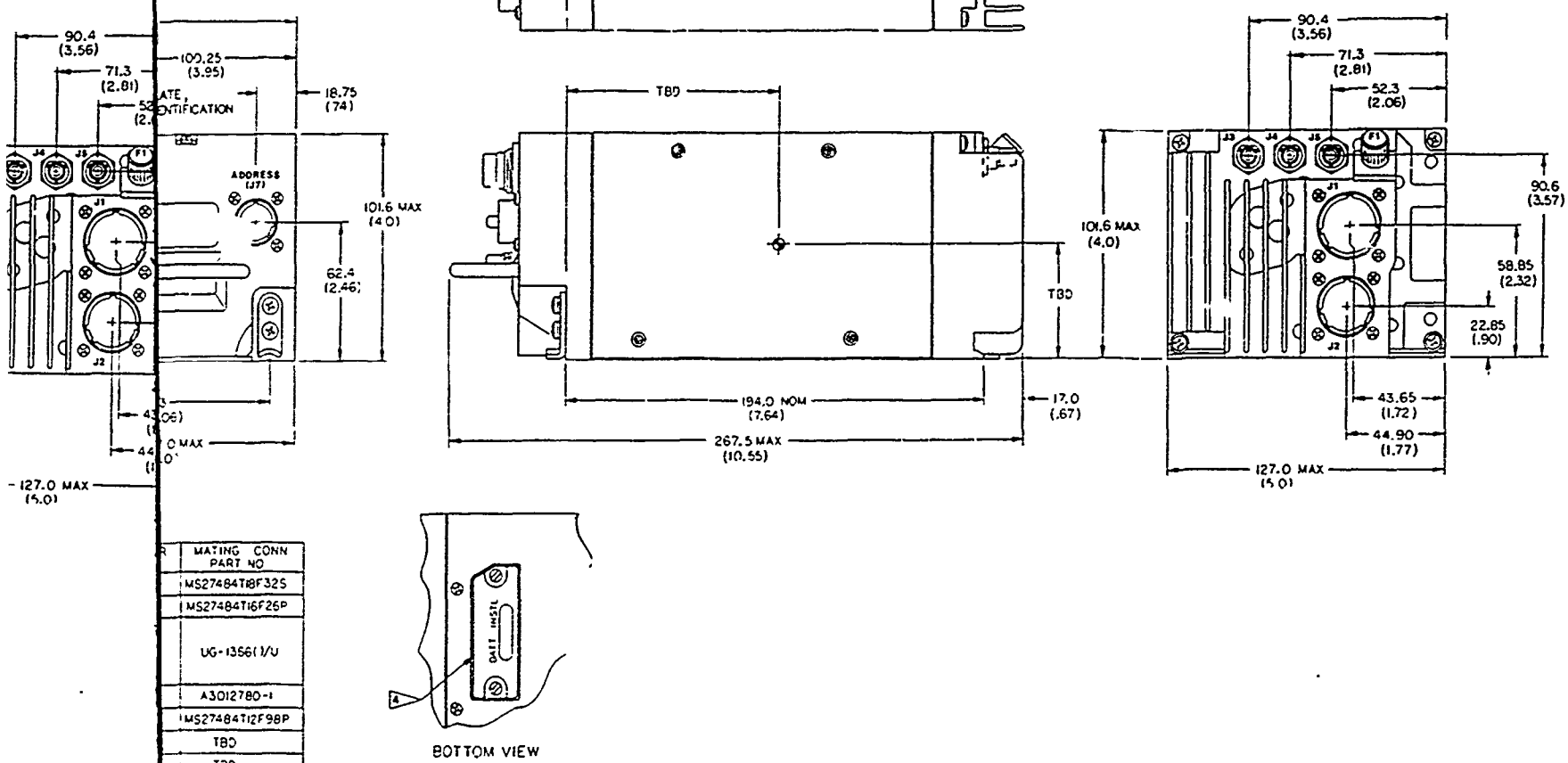
CONN	FUNCTION	ME OR VENDOR PART NO	MATING CONN PART NO.
J1	SYSTEM	B4042316-1	MS27484T18F32S
J2	ANCILLARY	B4042316-2	MS27484T16F26P
J3	COM ANT	B4042317-1	UG-1366(1)/U
J4	RT HOMING		
J5	LT HOMING		
J6	FILL	A3012761-2	A3012780-1
J7	ADDRESS	B4042250-1	MS27484T12F98P
J8	1553B-BUS A	B4041312-1	TBD
J9	1553B-BUS B	B4041312-2	TBD

ALL DIMENSIONS IN mm (in)



BOTTOM VIEW

Figure 4 3 1-3 Installation Control Drawing, 1553B RT-1478A



MATING CONN PART NO
MS27484T18F32S
MS27484T16F26P
UG-1356(1/U
A3012780-1
MS27484T12F98P
TBD
TBD

BOTTOM VIEW

Figure 4.3.1-? Installation Control Drawing, 1553B RT-1478A

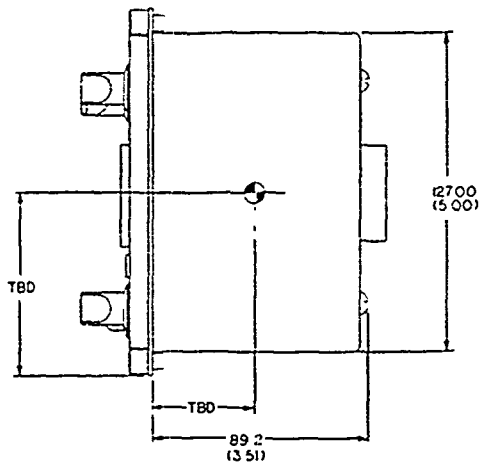
NOTES

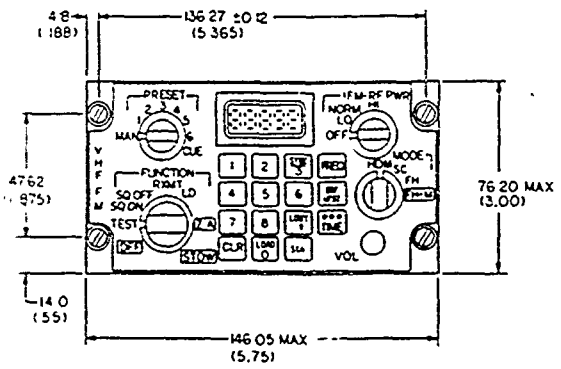
> EQUIPMENT PART NO A3015968-1

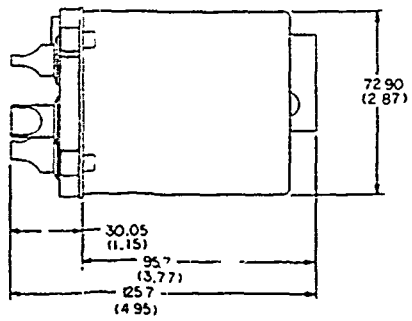
: WEIGHT - 1 81 KG (4 00 LB) MAX

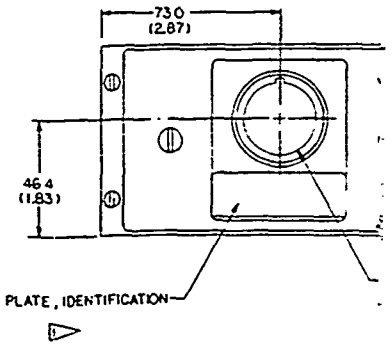
3 ⊕ DENOTES CENTER OF GRAVITY

ANN	FUNCTION	MIL OR VENDOR PART NO	MATING CONN PART NO
J1	CONTROL	B4042312-1	MS3126F24-61S









ALL DIMENSIONS IN mm (in)

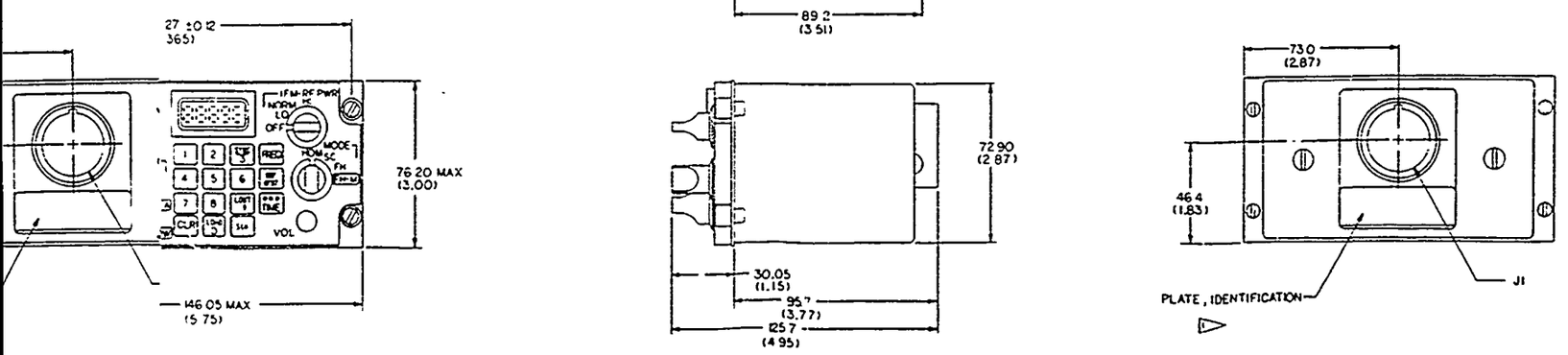
Figure 4 3 1-4 Installation Control Drawing, Radio Set C-11466

A3015968-1

B) MAX

)F GRAVITY

OR VENDOR ART NO	MATING CONN PART NO
42312-1	MS3126F24-61S



. DIMENSIONS IN mm (in)

Figure 4 3 1-4 Installation Control Drawing, Radio Set C-11466

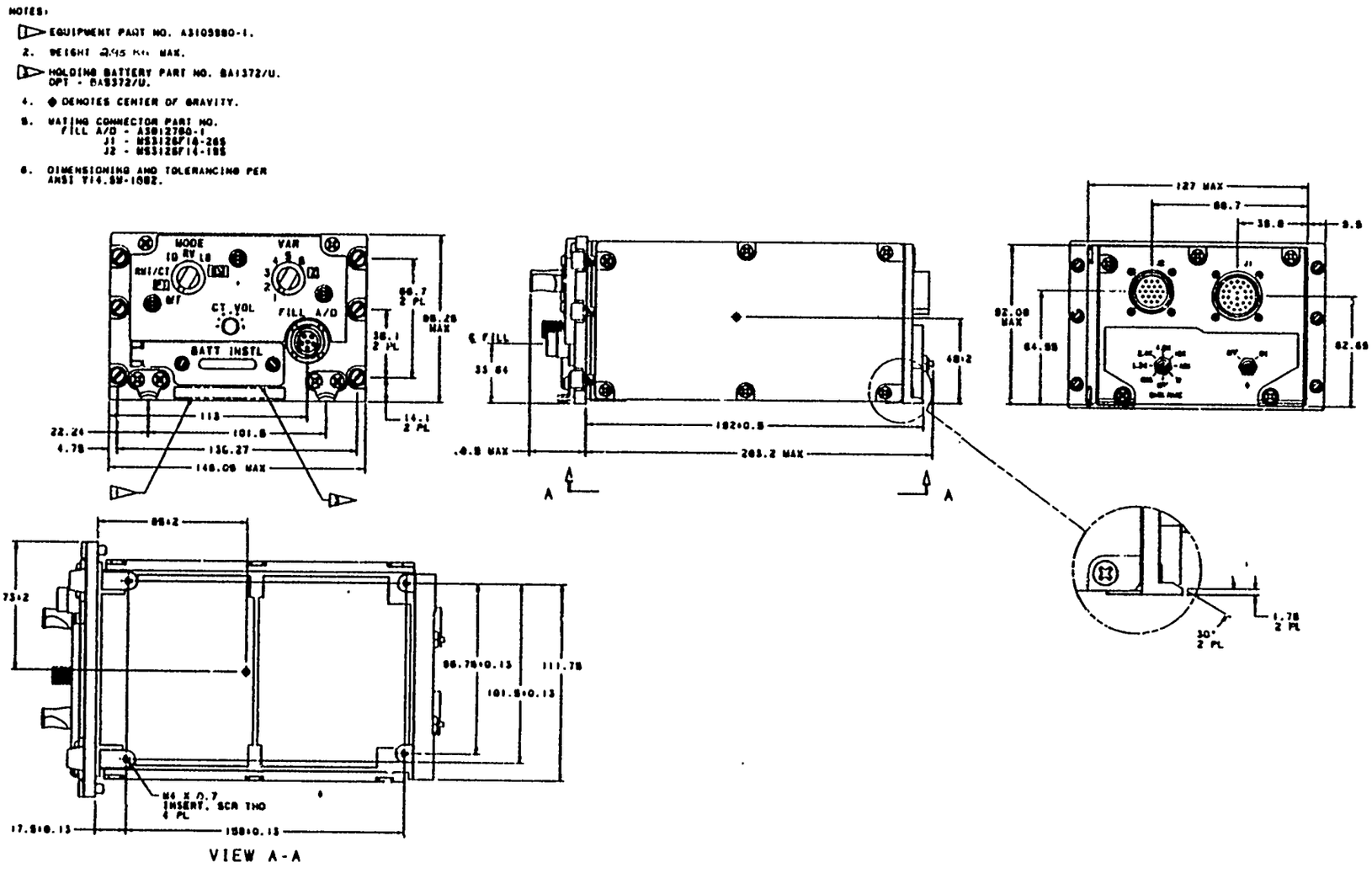
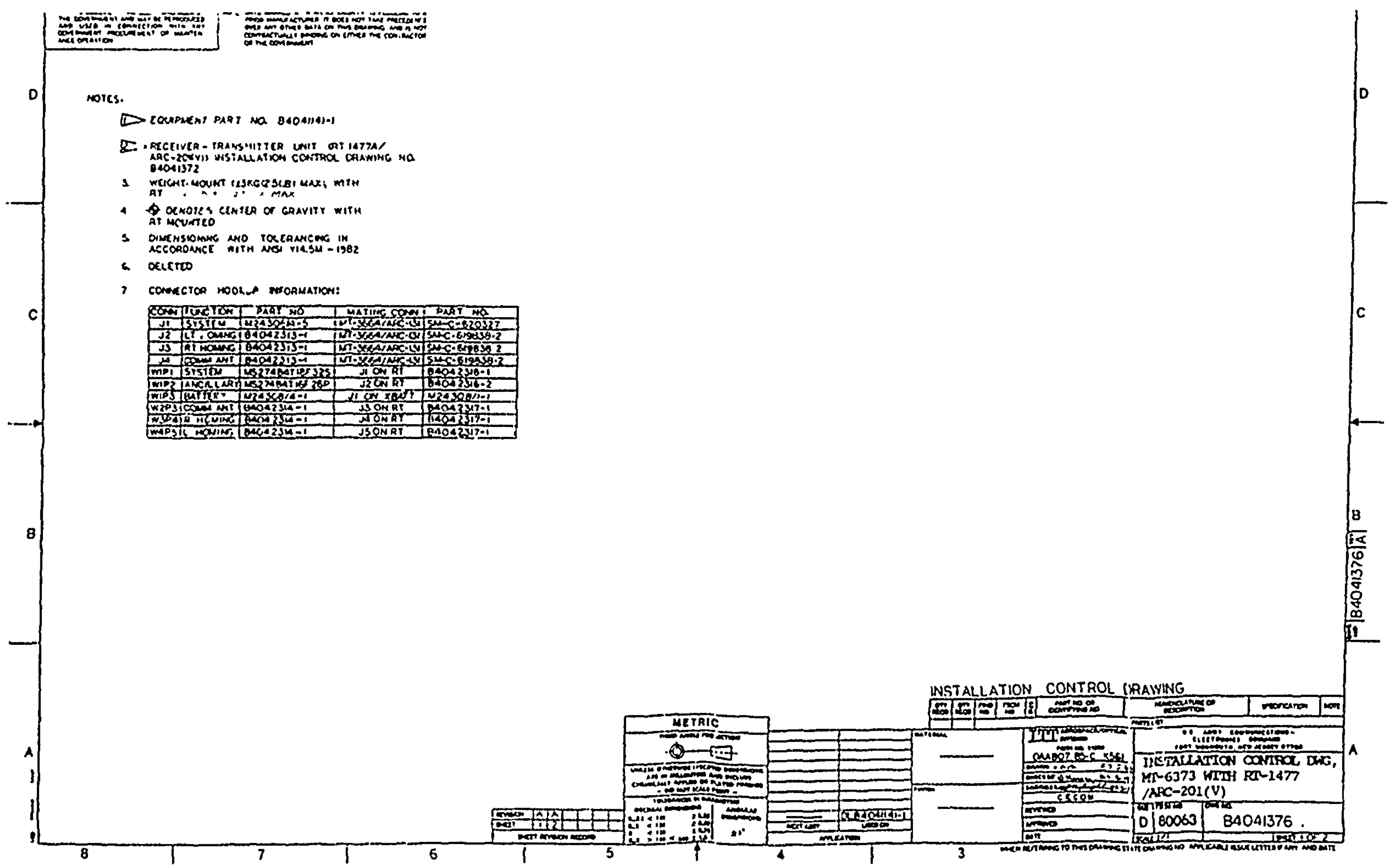


Figure 4.3.1-5. Installation Control Drawing, SDC - Panel Mount



CONN	FUNCTION	PART NO	MATING CONN	PART NO.
J1	SYSTEM	M24308/4-5	MT-3664/ARC-131	SM-C-620327
J2	LT. OMNG	B4042313-1	MT-3664/ARC-131	SM-C-619838-2
J3	RT HOMING	B4042313-1	MT-3664/ARC-131	SM-C-619838-2
J4	COMM ANT	B4042313-1	MT-3664/ARC-131	SM-C-619838-2
W1P1	SYSTEM	MS27484T12F32S	J1 ON RT	B4042316-1
W1P2	ANCILLARY	MS27484T16F26P	J2 ON RT	B4042316-2
W1P3	BATTERY	M24308/4-1	J1 ON XBATT	M24308/2-1
W2P3	COMM ANT	B4042314-1	J3 ON RT	B4042317-1
W3P4	R HOMING	B4042314-1	J4 ON RT	B4042317-1
W4P5	L HOMING	B4042314-1	J5 ON RT	B4042317-1

Figure 4.3.1-6. Installation Control Dwg, MT-6373 with RT-1477A/ARC-201A(V) (Sheet 1 of 2)

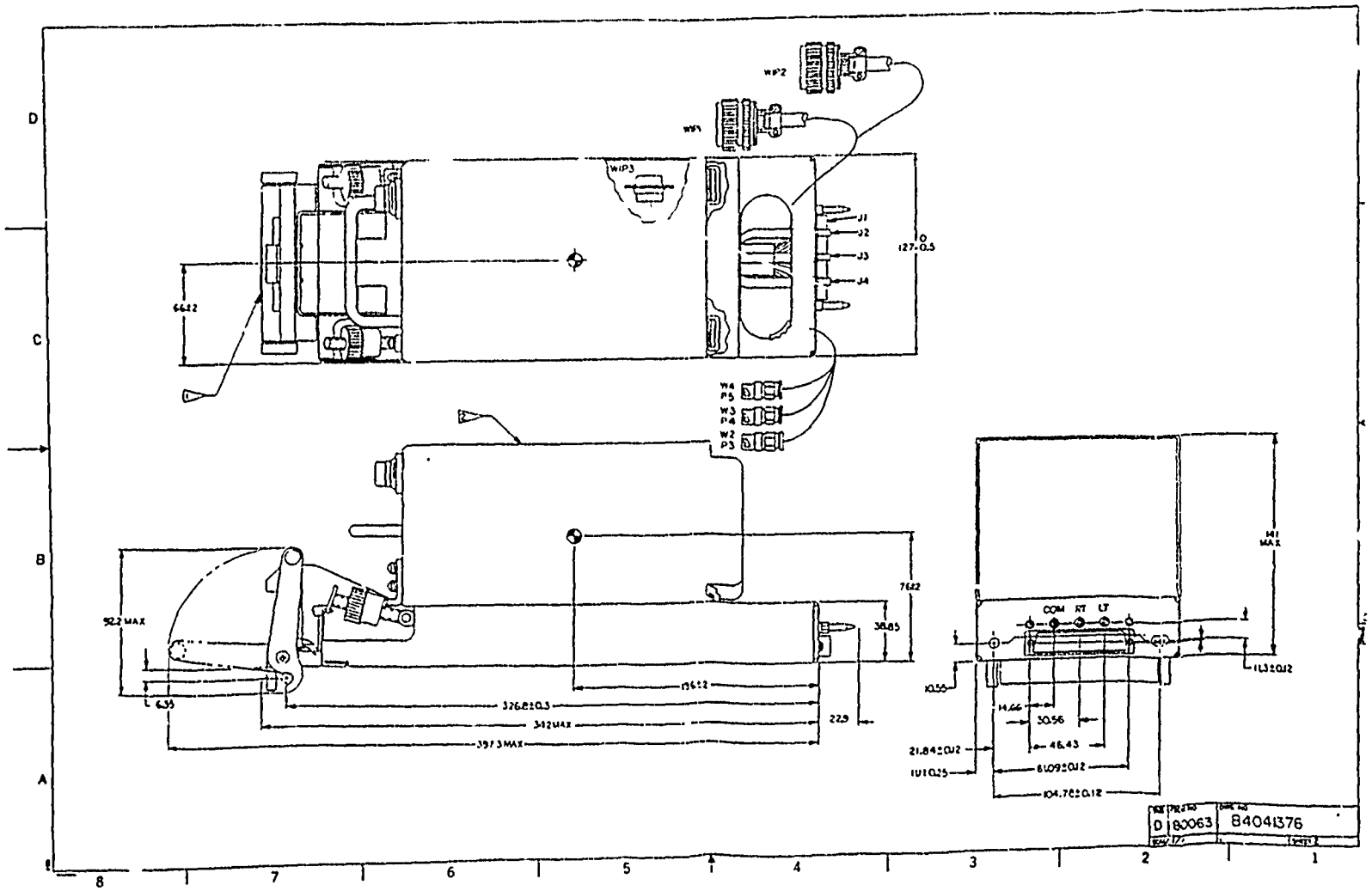


Figure 4.3.1-6. Installation Control Dwg, MT-6373 with RT-1477A/ARC-201A(V)
(Sheet 2 of 2)

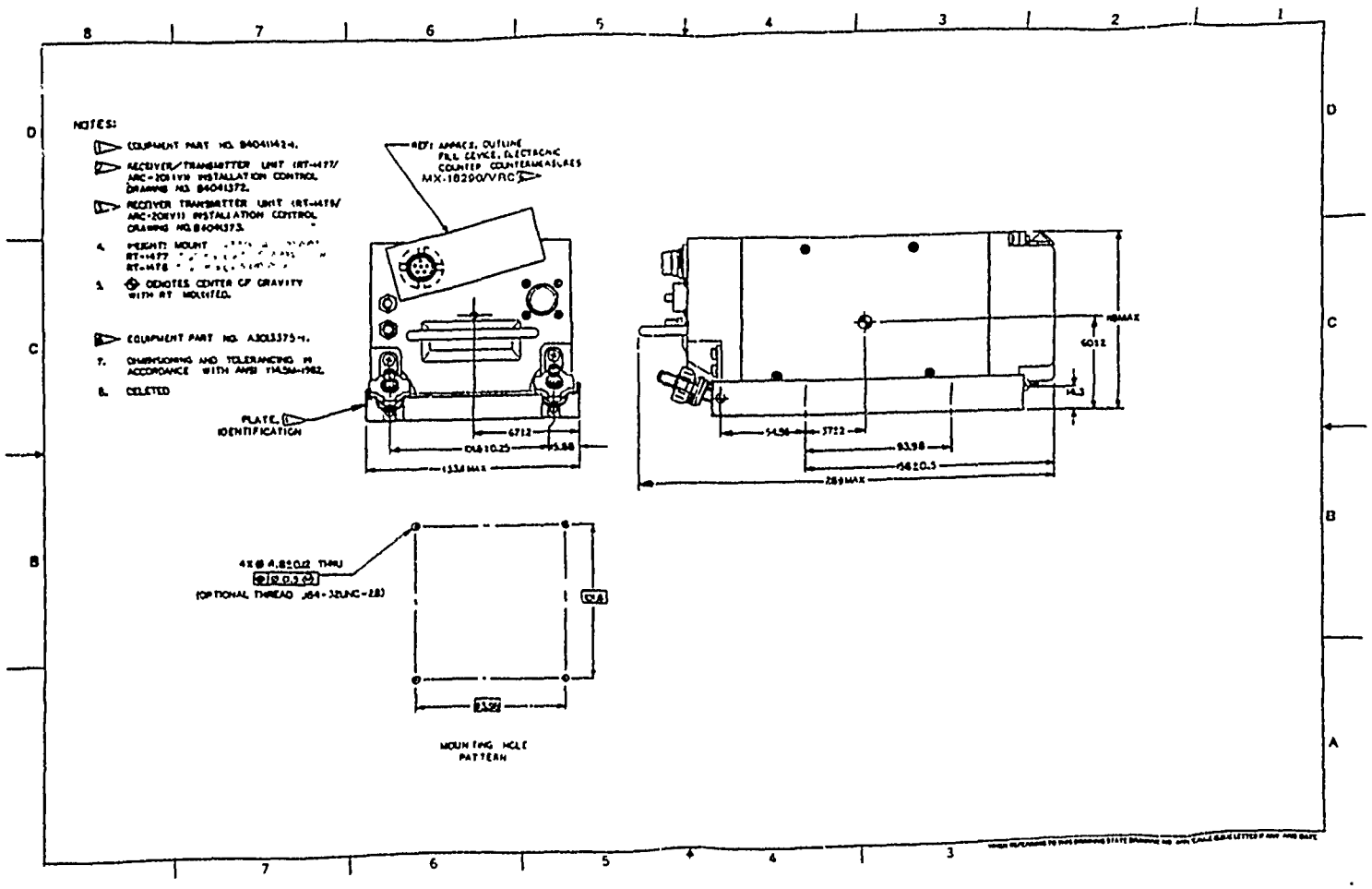


Figure 4.3.1-7. Installation Control Dwg, MT-6374 with RT-1477A or RT-1478A/ARC-201A(V) (Sheet 1 of 2)

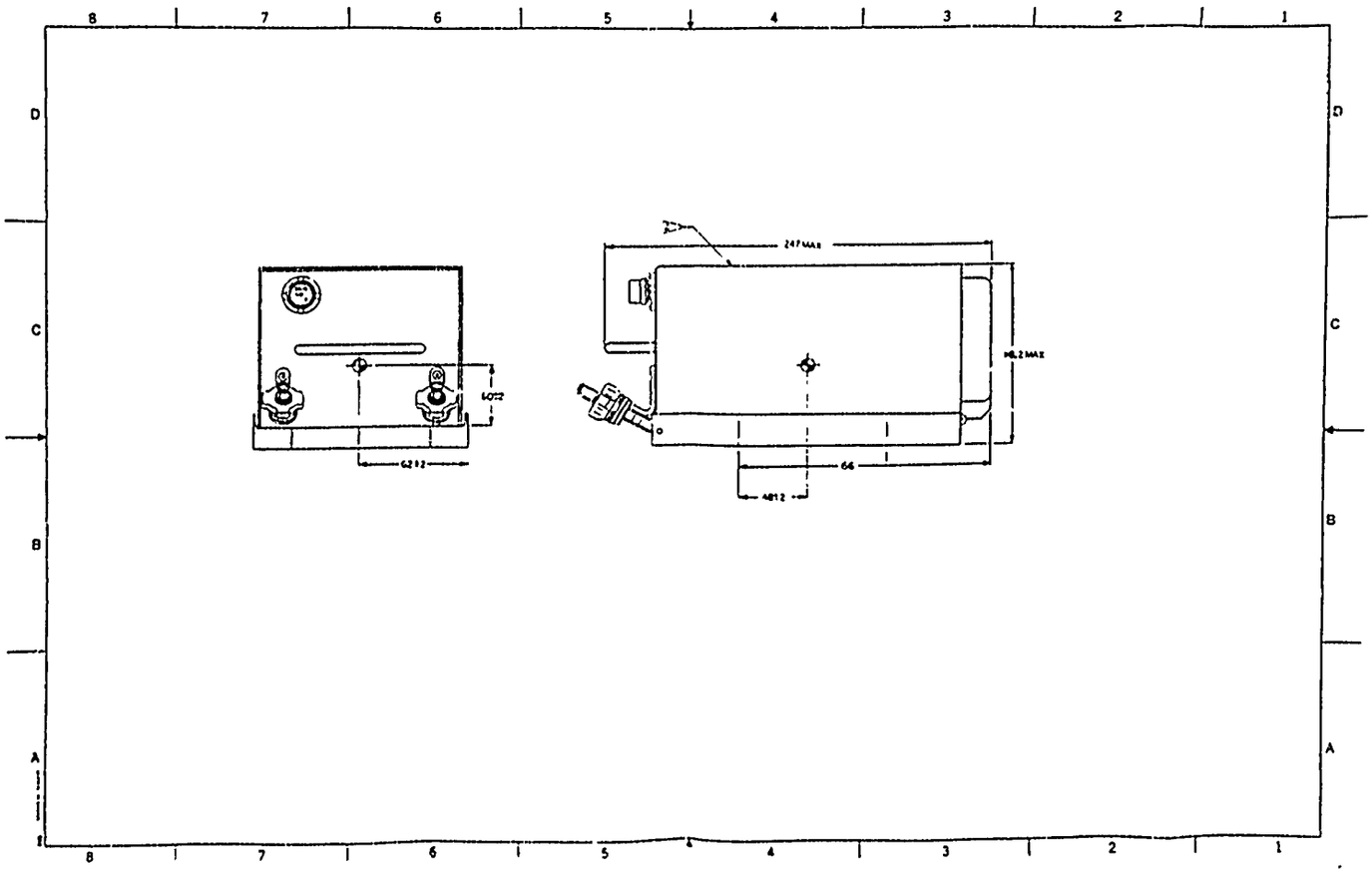


Figure 4.3.1-7. Installation Control Dwg, MT-6374 with RT-1477A or RT-1478A/ARC-201A(V)
(Sheet 2 of 2)

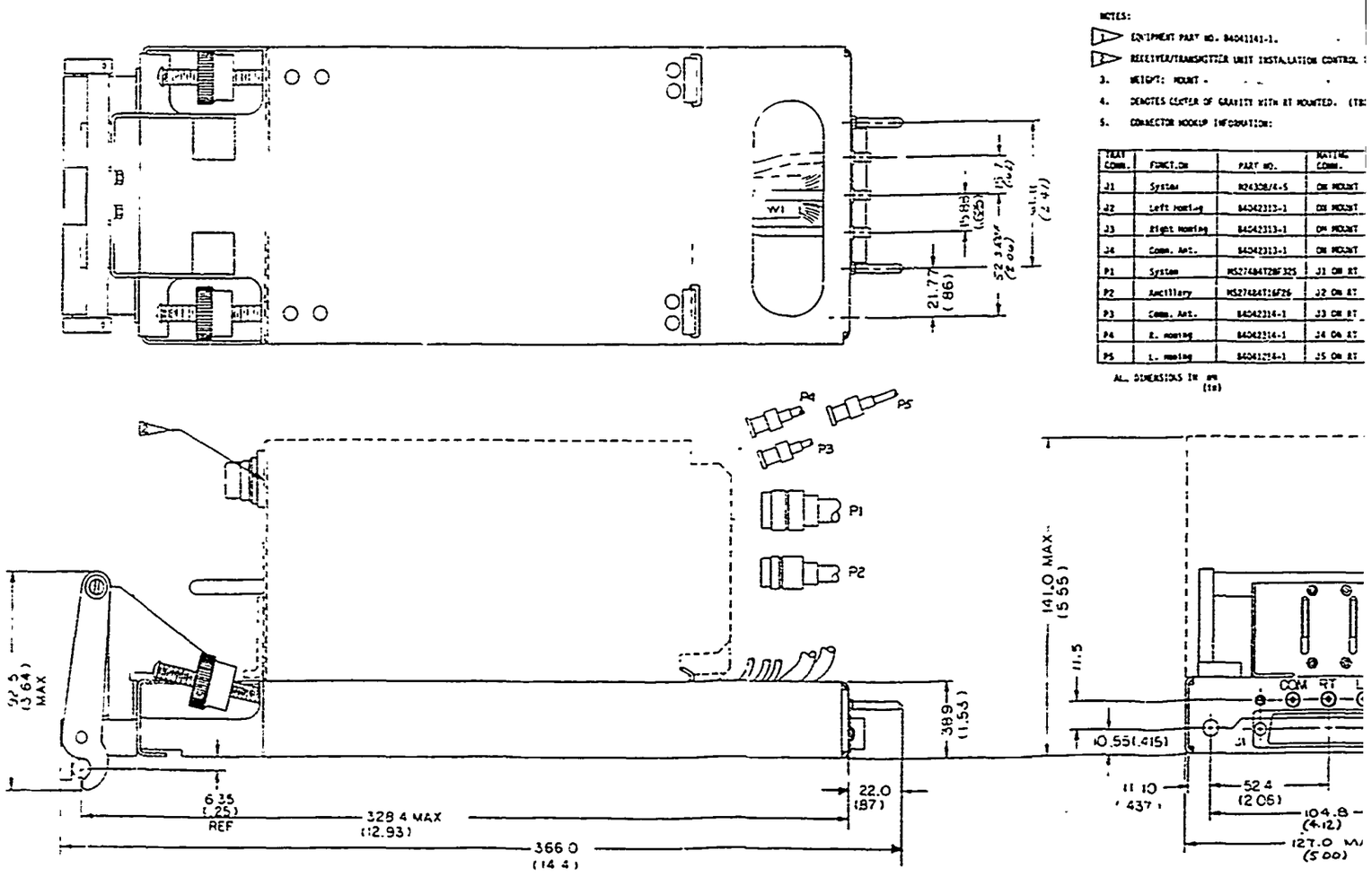


Figure 4.3.1-8 Installation Control Drawing, Adapter Tray MT-6373 with RT-1477A

NO. 84041141-1.

CEIVER UNIT INSTALLATION CONTROL DRA

OF GRAVITY WITH RT MOUNTED. (TBD)

R INFORMATION:

	PART NO.	MATING CONN.
	M24308/4-5	ON MOUNT
	84042313-1	ON MOUNT
	84042313-1	ON MOUNT
	84042313-1	ON MOUNT
	MS27484728F325	J1 ON RT
	MS27484716F26	J2 ON RT
	84042314-1	J3 ON RT
	84042314-1	J4 ON RT
	84041214-1	J5 ON RT

MM
(IN)

NOTES:

1. EQUIPMENT PART NO. 84041141-1.
2. RECEIVER/TRANSMITTER UNIT INSTALLATION CONTROL DRAWING NO. 84041372.
3. WEIGHT: MOUNT -
4. DENOTES CENTER OF GRAVITY WITH RT MOUNTED. (TBD)
5. CONNECTOR HOOKUP INFORMATION:

TRAY CONN.	FUNCTION	PART NO.	MATING CONN.	PART NO.
J1	System	M24308/4-5	ON MOUNT	M24308/1-16
J2	Left Hanging	84042313-1	ON MOUNT	2M53742-5086
J3	Right Hanging	84042313-1	ON MOUNT	2M53742-5086
J4	Comm Ant.	84042313-1	ON MOUNT	2M53742-5086
P1	System	MS27484728F325	J1 ON RT	84042316-1
P2	Auxiliary	MS27484716F26P	J2 ON RT	84042316-2
P3	Comm. Ant.	84042314-1	J3 ON RT	84042317-1
P4	R. Hanging	84042314-1	J4 ON RT	84042317-1
P5	L. Hanging	84041214-1	J5 ON RT	84042317-1

ALL DIMENSIONS IN mm
(IN)

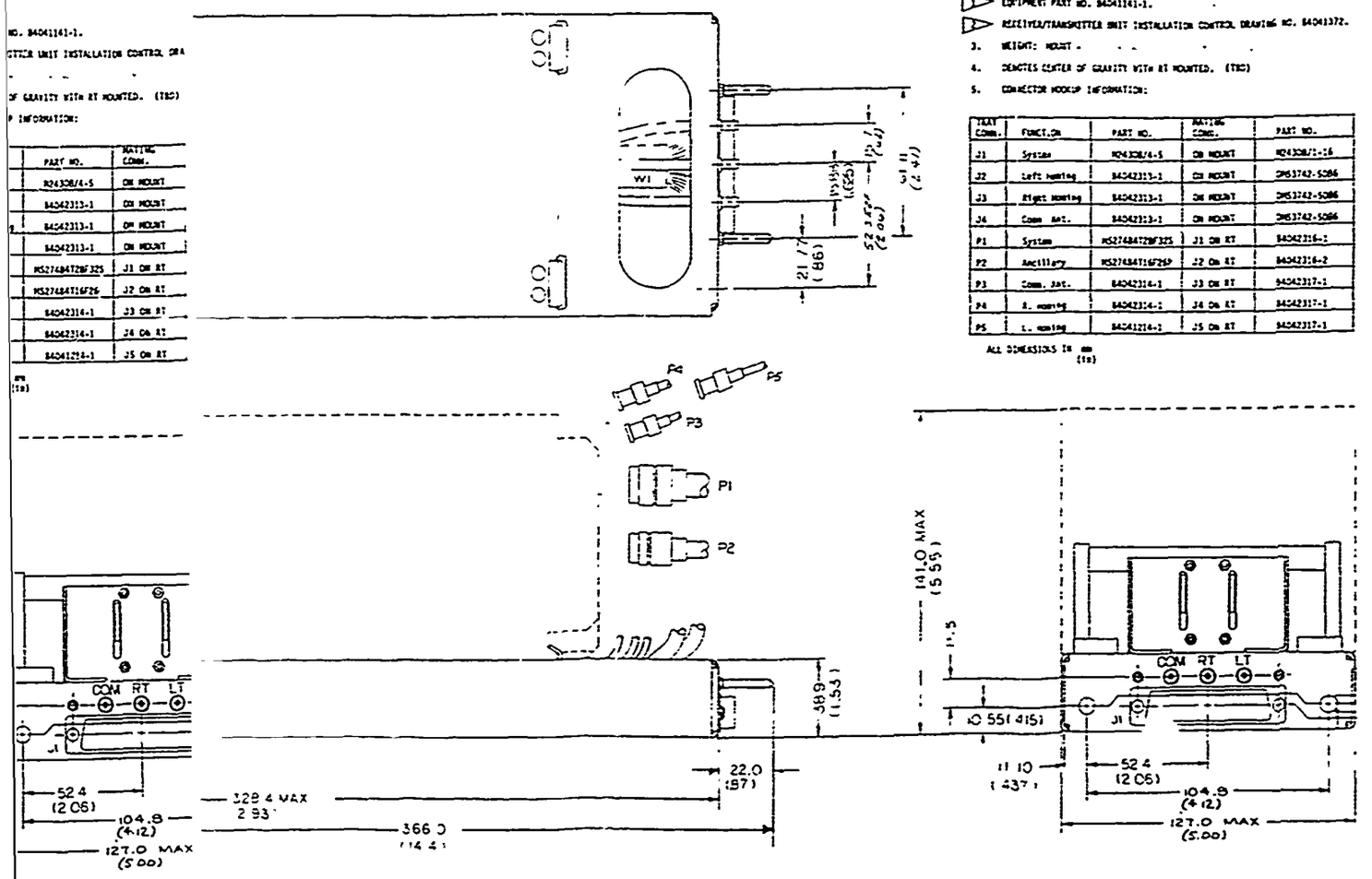


Figure 4-3-4. Installation Control Drawing, Adapter Tray MT-6373 with RT-1473A

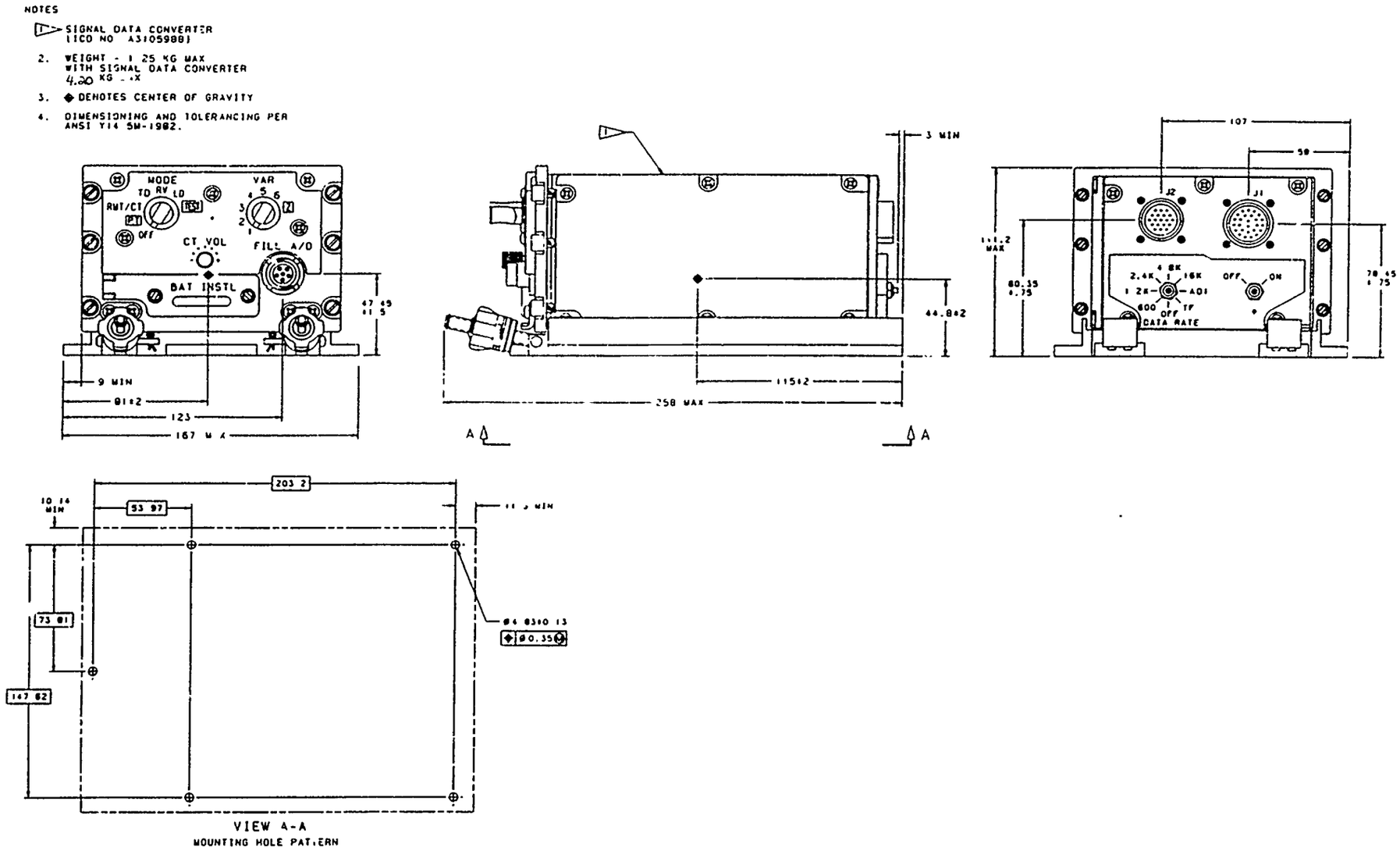


Figure 4.3.1-9. Installation Control Drawing, SDC on Hard Mount

NOTES:

1. EQUIPMENT PART NO. A5105846-1.
2. WEIGHT - 3.17 KG MAX WITH SIGNAL DATA CONVERTER - 4.08 KG MAX.
3. SIGNAL DATA CONVERTER (ICD NO. A5106888).
4. ◆ DENOTES CENTER OF GRAVITY.
5. MATING CONNECTOR PART NO.
   FILL A/D - ASW13780-1
   J1 - MS5126C12-10S
   J2 - MS5126F16-26SW
6. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.

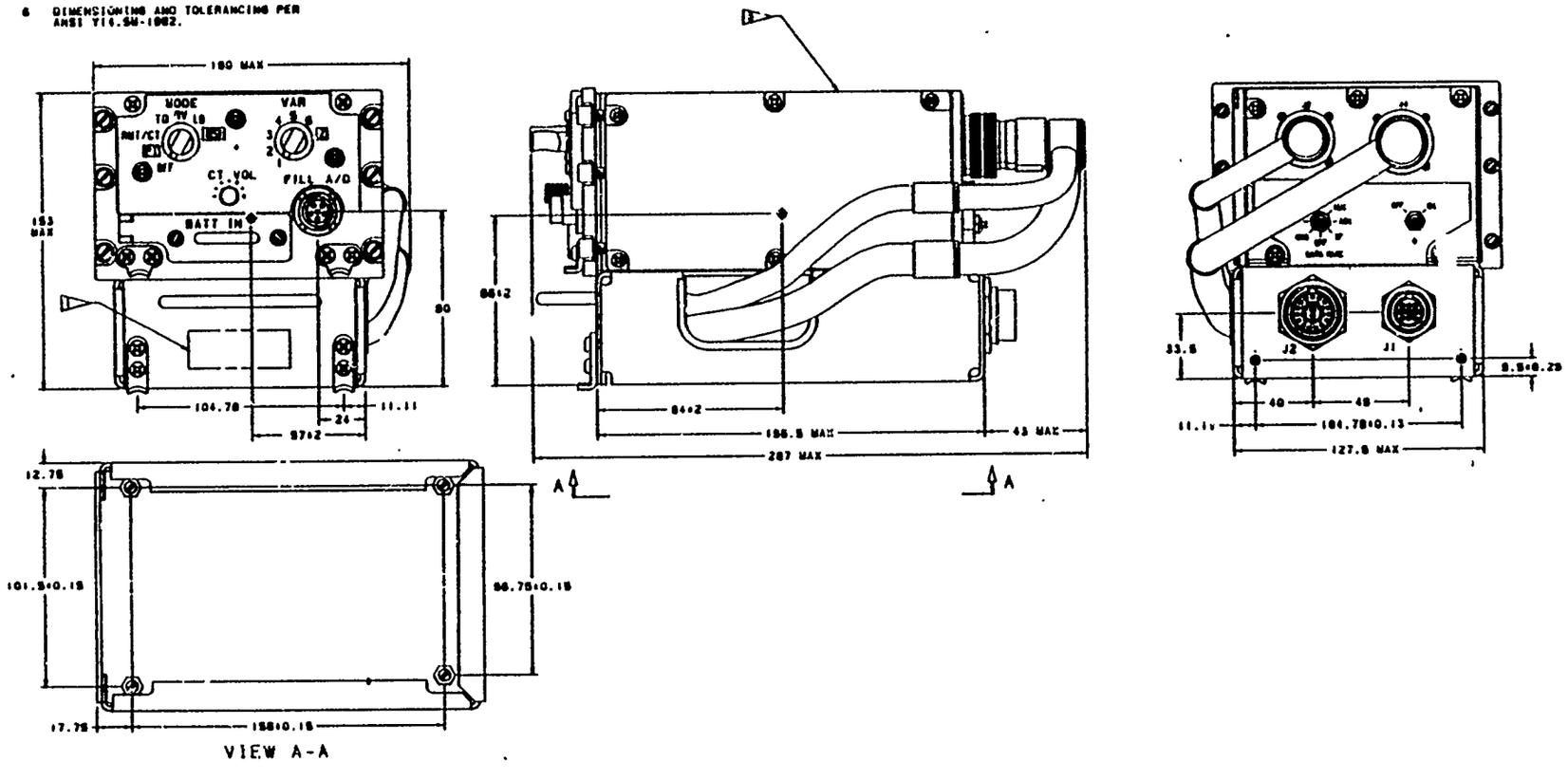


Figure 4.3.1-10. Installation Control Drawing, SDC on Adapter Mount

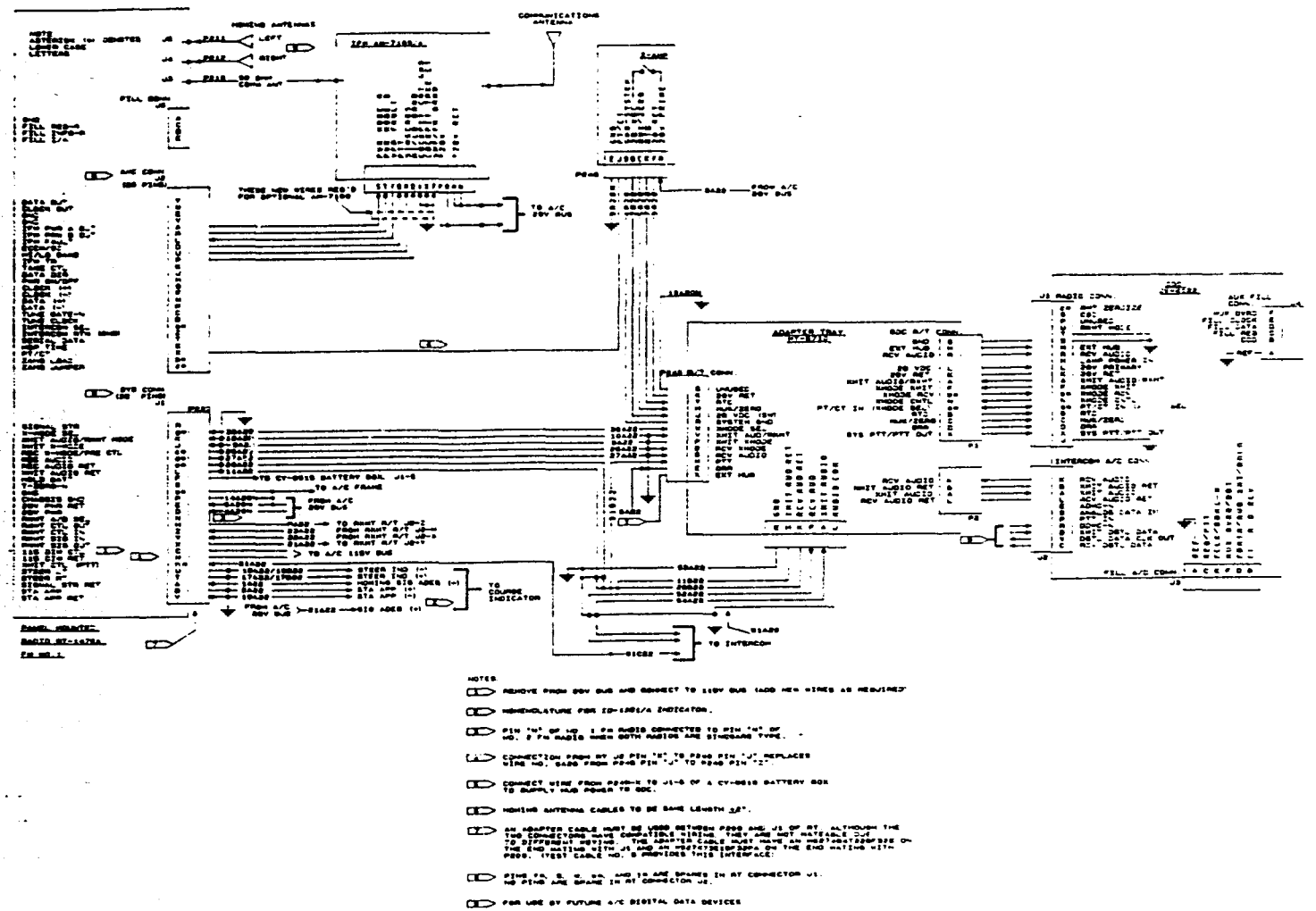


Figure 4.3.2-1. Interconnect Radio System Drawing, Panel Mounting Radio, Adapter Mounted SDC and Z-AHP for Existing Installations

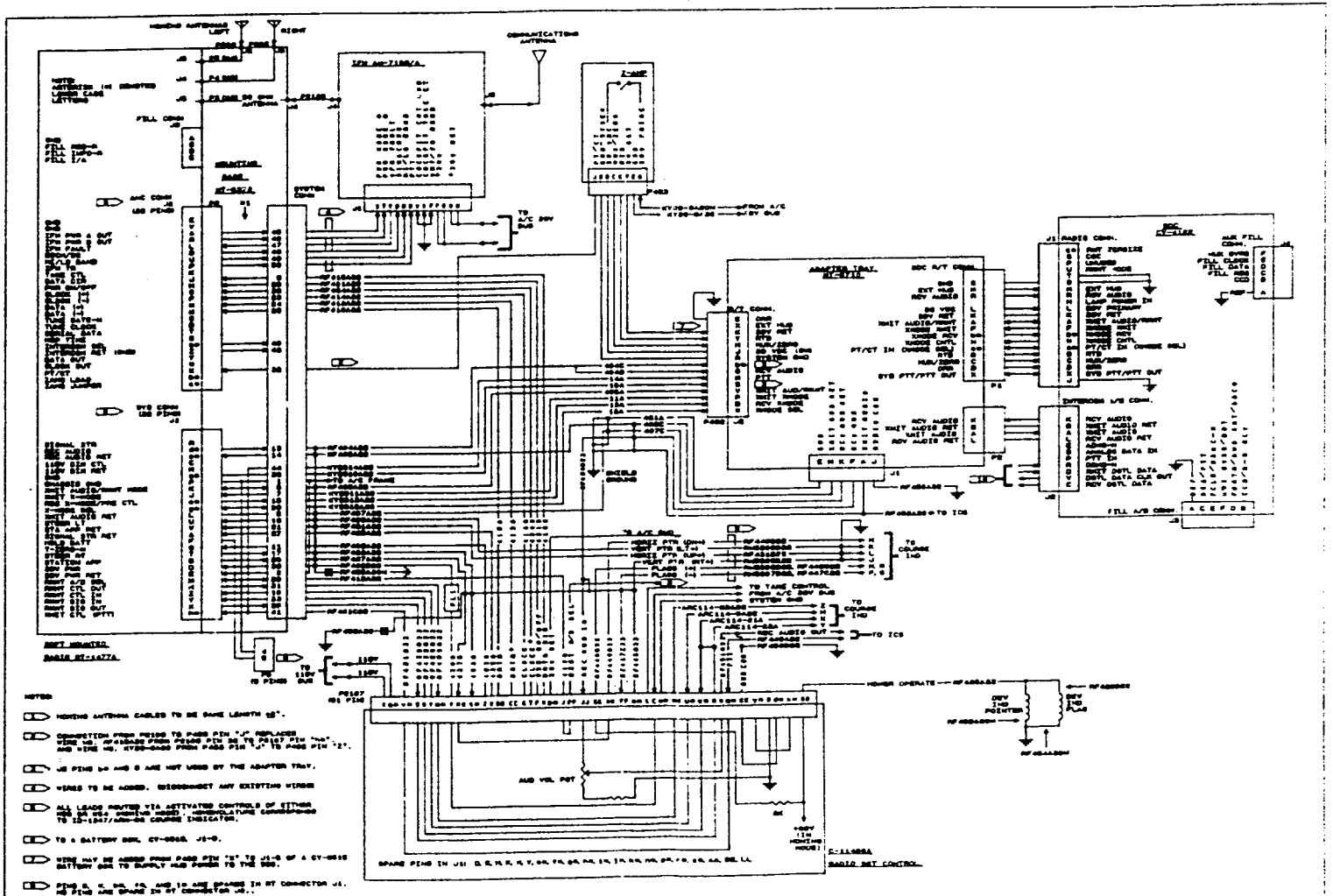


Figure 4.3.2-2. Interconnect Radio System Drawing, Dedicated Remote Radio. Adapter Mounted SDC and Z-AHP for Existing Installations

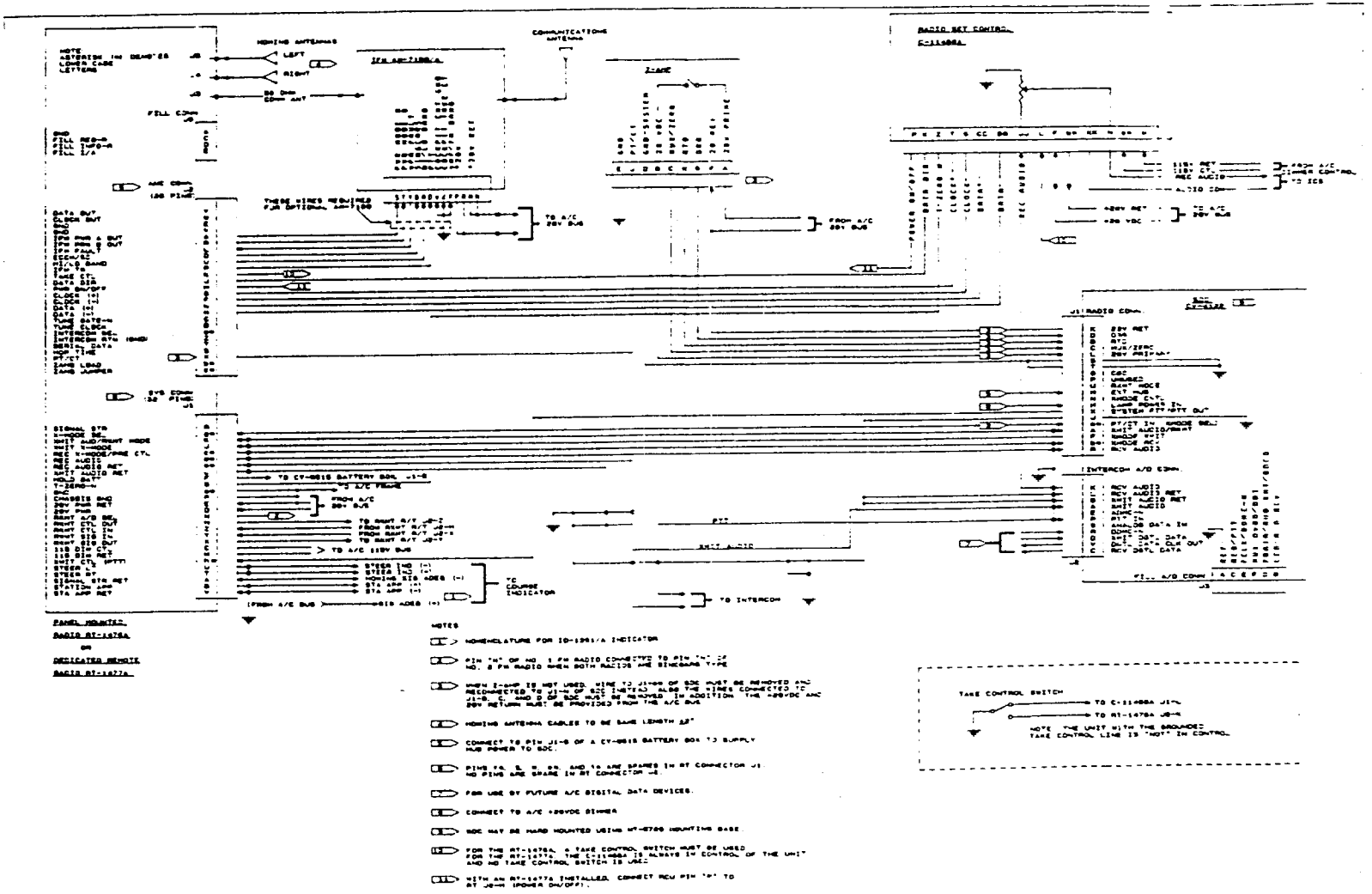


Figure 4.3.2-3. Interconnect Radio System Drawing. Dedicated Remote or Panel Mounted Radio with Remote Control Unit, Panel or Hard Mounted SDC and Z-AHP. For New Installations.

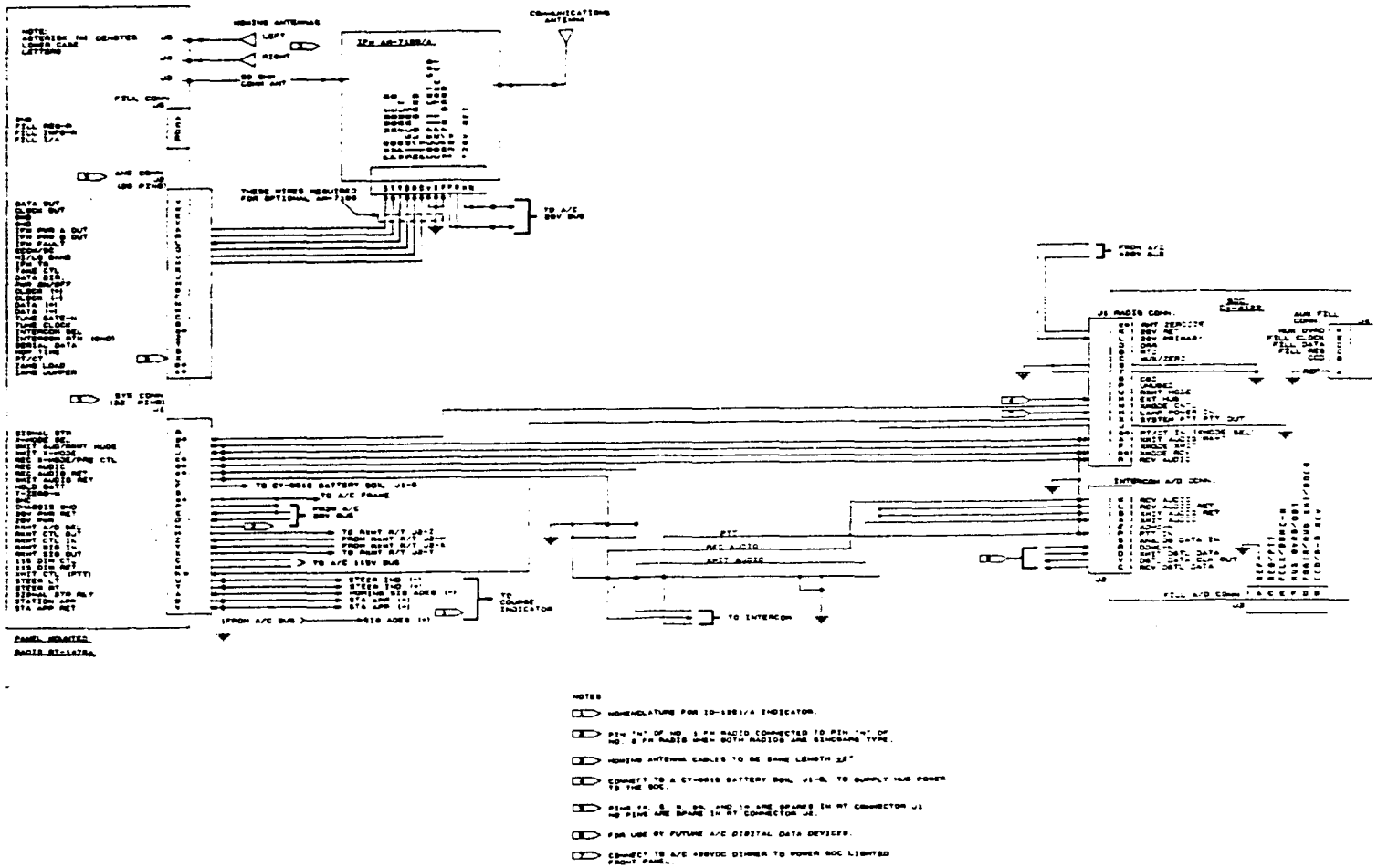


Figure 4.3.2-4. Interconnect Radio System Drawing. Panel Mounted Radio and Panel Mounted SDC. For New Installations.

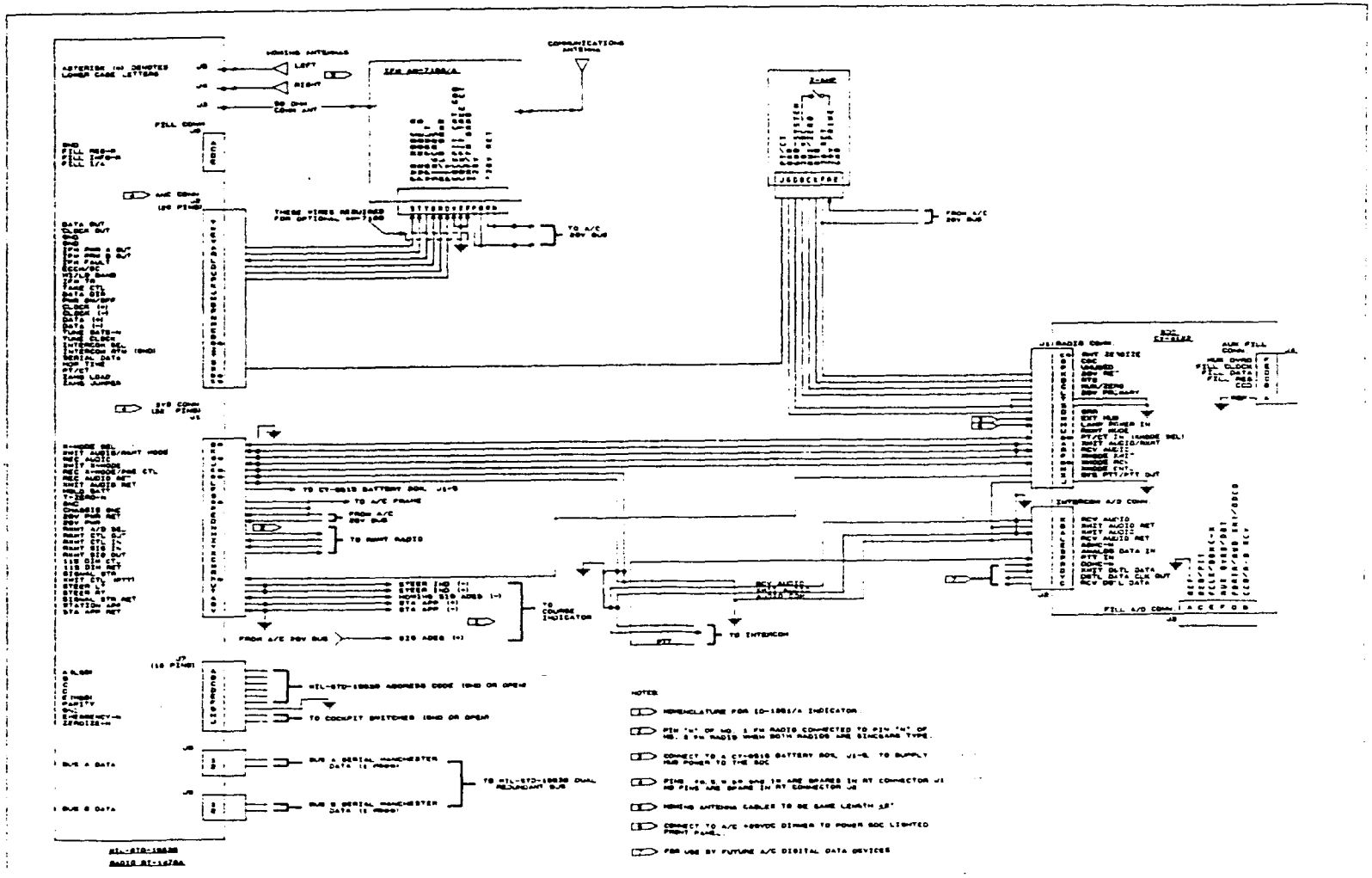


Figure 4.3.2-5. Interconnect Radio System Drawing. MIL-STD-1553B Radio. Remotely Mounted SDC and Z-AHP. For New Installations.

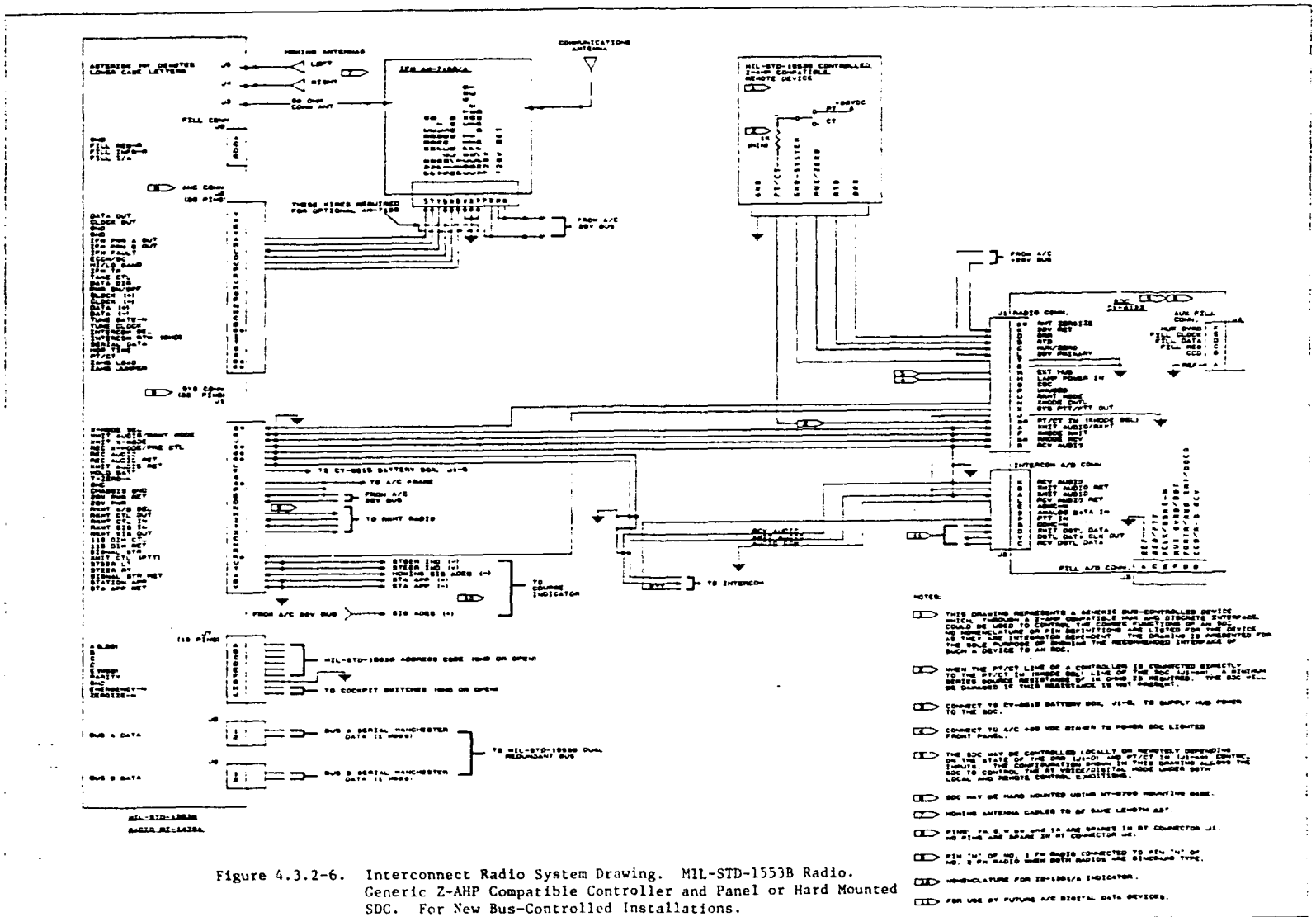


Figure 4.3.2-6. Interconnect Radio System Drawing. MIL-STD-1553B Radio. Generic Z-AHP Compatible Controller and Panel or Hard Mounted SDC. For New Bus-Controlled Installations.

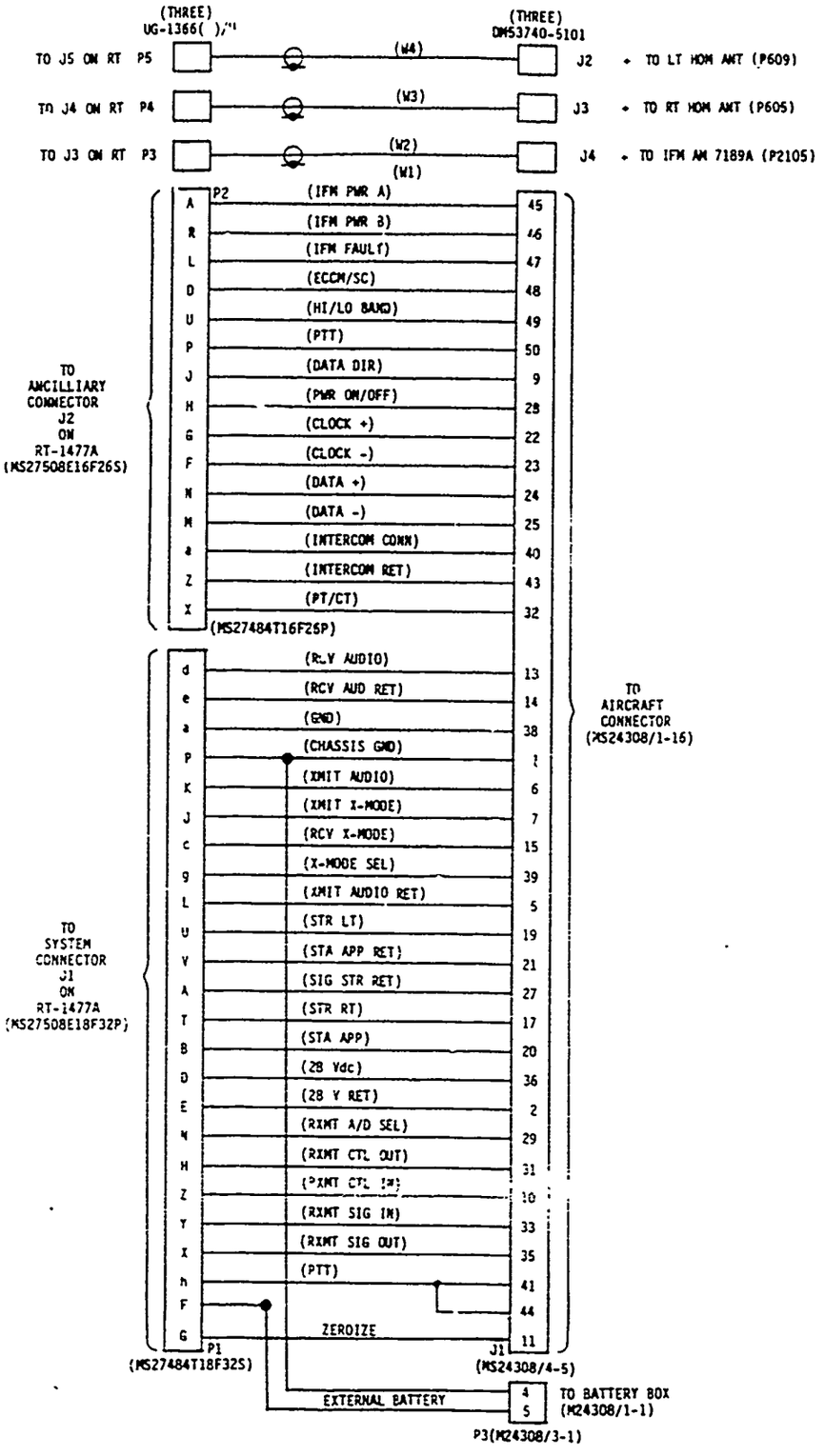


Figure 4.3.2-7. Wiring Diagram for MT-6373 Mounting Base

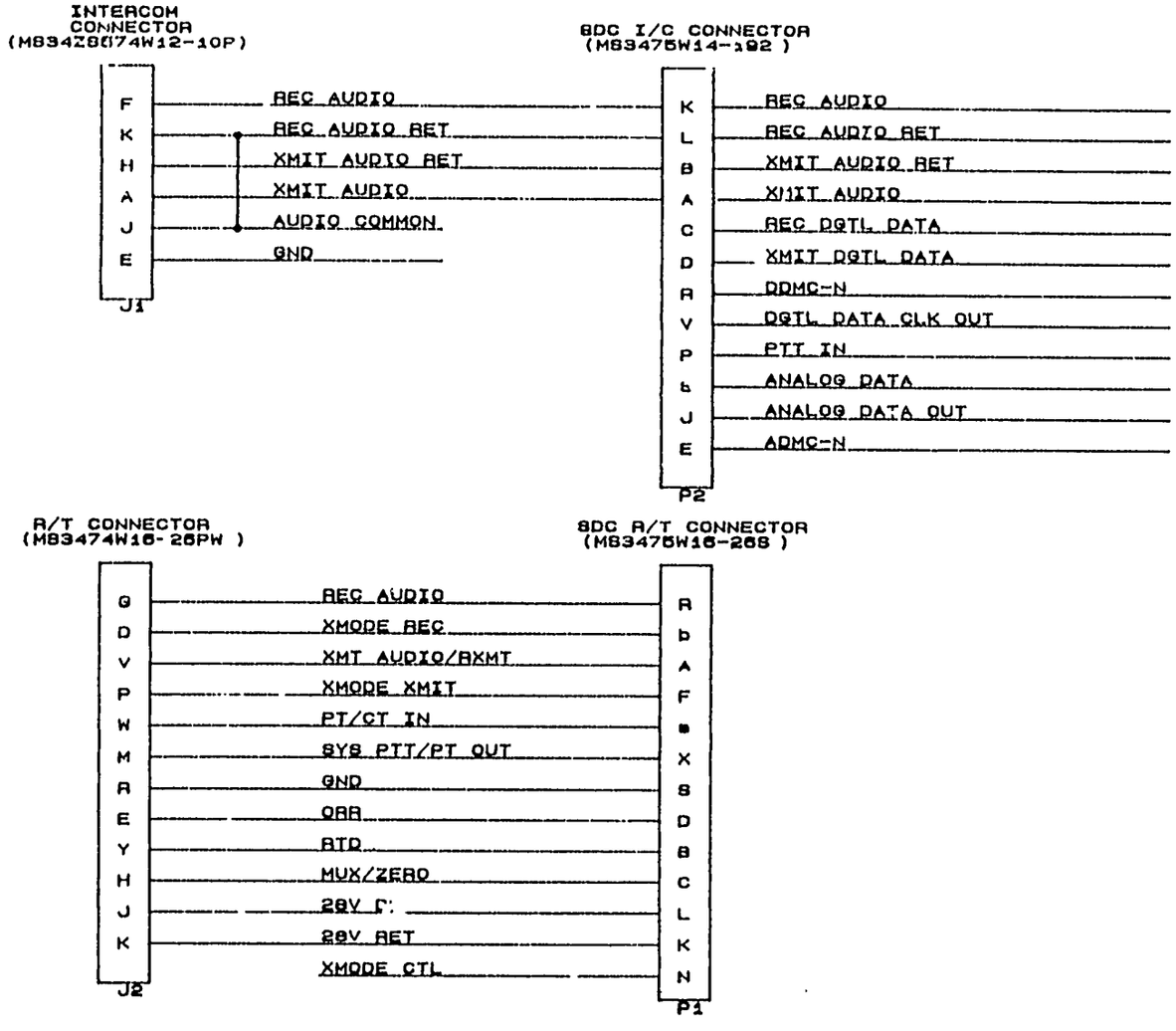


Figure 4.3.2-8. Wiring Diagram for SDC Adapter Mount

provided with the various units of test equipment. The cabling between units shall be in accordance with MIL-W-5088 and shall be so arranged that the component parts are accessible. The power source shall be connected into the test bench wiring and shall be protected by suitable fuses or circuit breakers. Allow the required warm-up time for each piece of test equipment. An alternate maintenance kit, the OA-9264A/ARC, may be used with the procedures and diagrams described in TM-11-5821-333-30.

4.4.1.1 Test Cable Diagrams. Those test cables which are considered a part of the Bench Test Setup are depicted in Figures 4.4.1.1-1 through 4.4.1.1-6. The purpose and use of each cable is explained on the applicable figure. Any equivalent cable or interconnect wiring may be used especially GFE cables and those cables which are part of the MK-994/AR test kit.

4.4.1.2 Standard Conditions. Standard conditions for the AN/ARC-201A(V) shall be as follows:

a. Input voltage; 27.5 + 0.5, -0.0 Vdc.

NOTE: The voltage drop through the MK-994/AR is 0.5 Vdc. Therefore, the voltage at the power source must be +28.0 + 0.5, -0.0 Vdc.

b. RF impedance: 50 ohms resistive.

c. Audio input signal (XMIT): 0 dBm into 150 ohms, ungrounded. (387 mVrms)

d. Audio output signal (RECD): 50 mW into 150 ohm load (2.73 Vrms) (at 16 to 22 kHz p-p deviation).

e. Temperature: Room ambient (25° ± 5°C).

f. Altitude: Normal ground.

g. Vibration: None.

h. Humidity: Room ambient

i. Standard analog voice test signal: A standard analog voice test signal is defined as an RF signal that is frequency modulated at 1000 Hz at ±6.5 kHz deviation from a signal generator having an internal impedance of 50 ohms resistive.

4.4.1.3 Input Power. All power sources shall be in accordance with 3.2.7.

4.4.2 Visual and Mechanical Inspection. All equipment shall be inspected for external damage. Remove all dust, dirt, foreign or packing material. Check all external controls to see that they operate freely and properly.

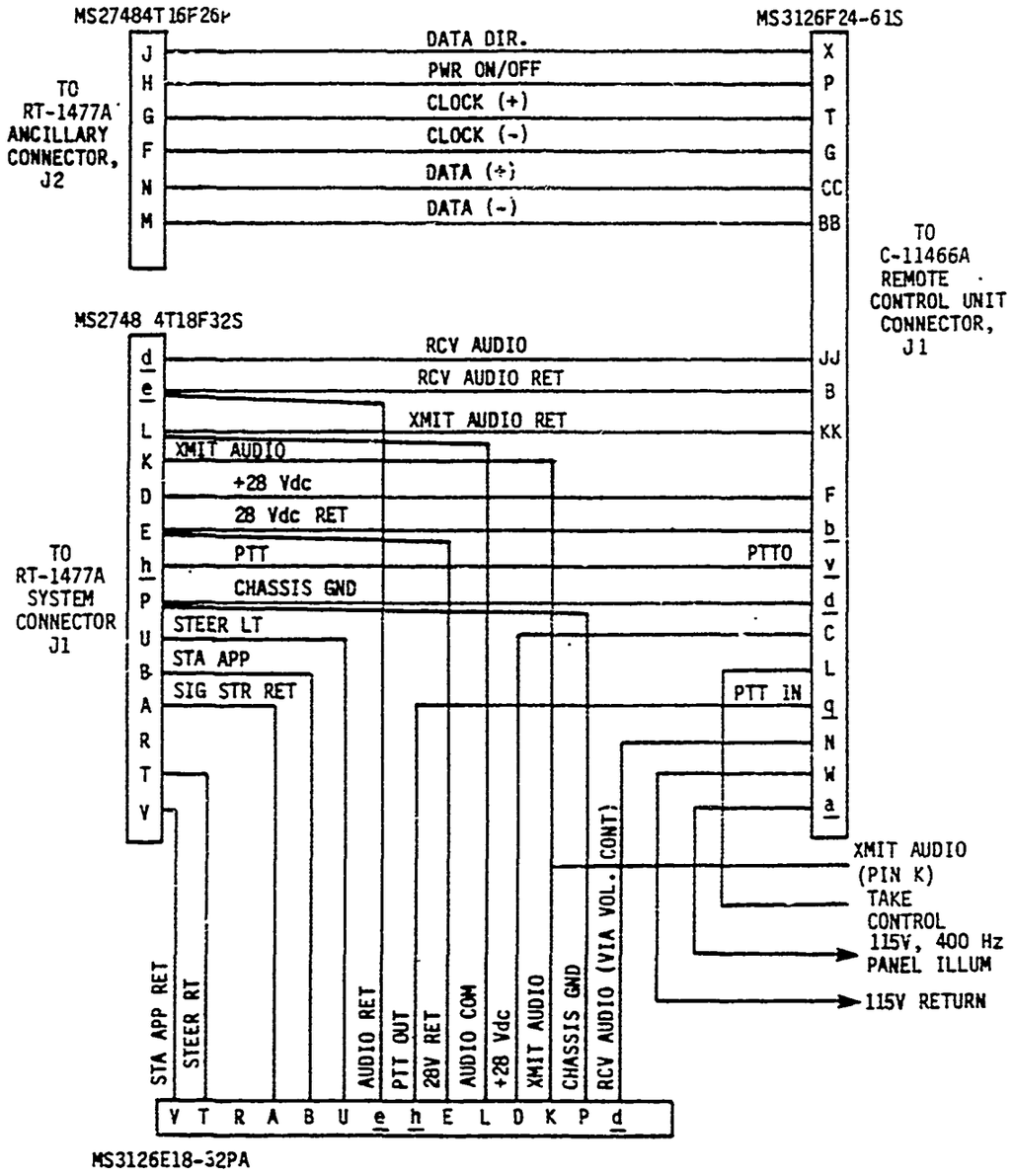
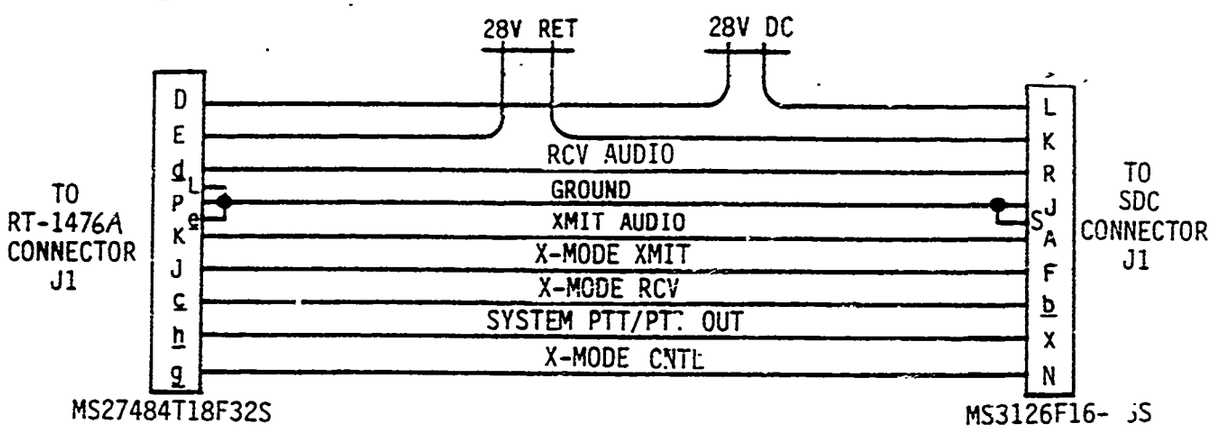
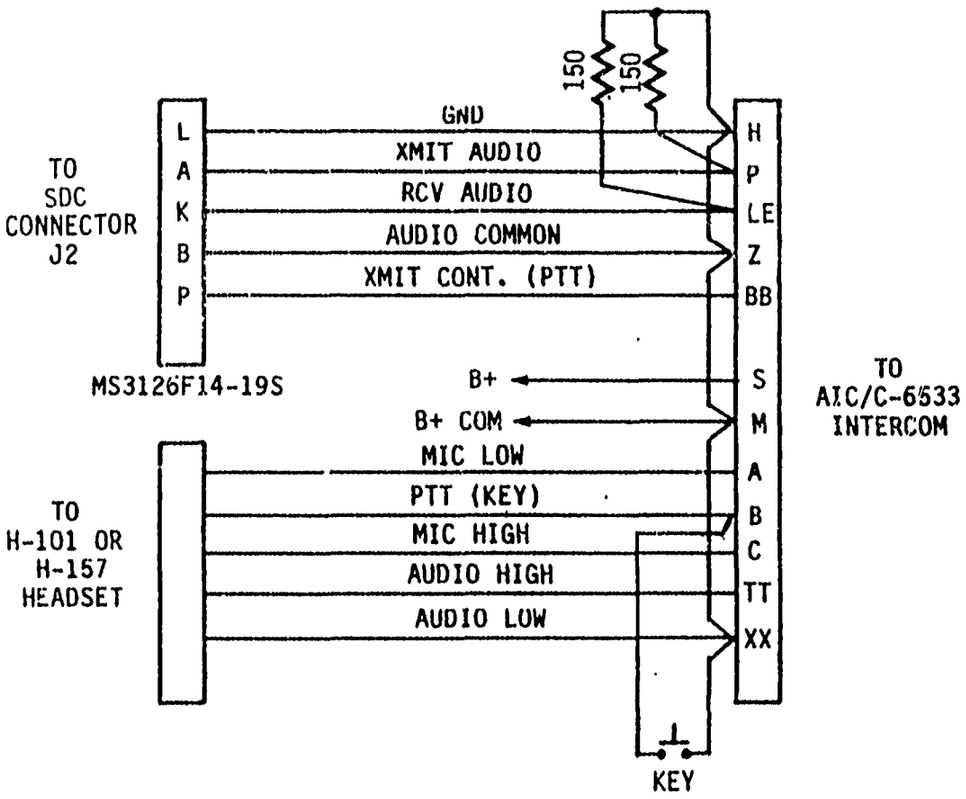


Figure 4.4.1.1-1. Test Cable No. 1 (RT-1477A Radio to C-11466A Remote Control Unit



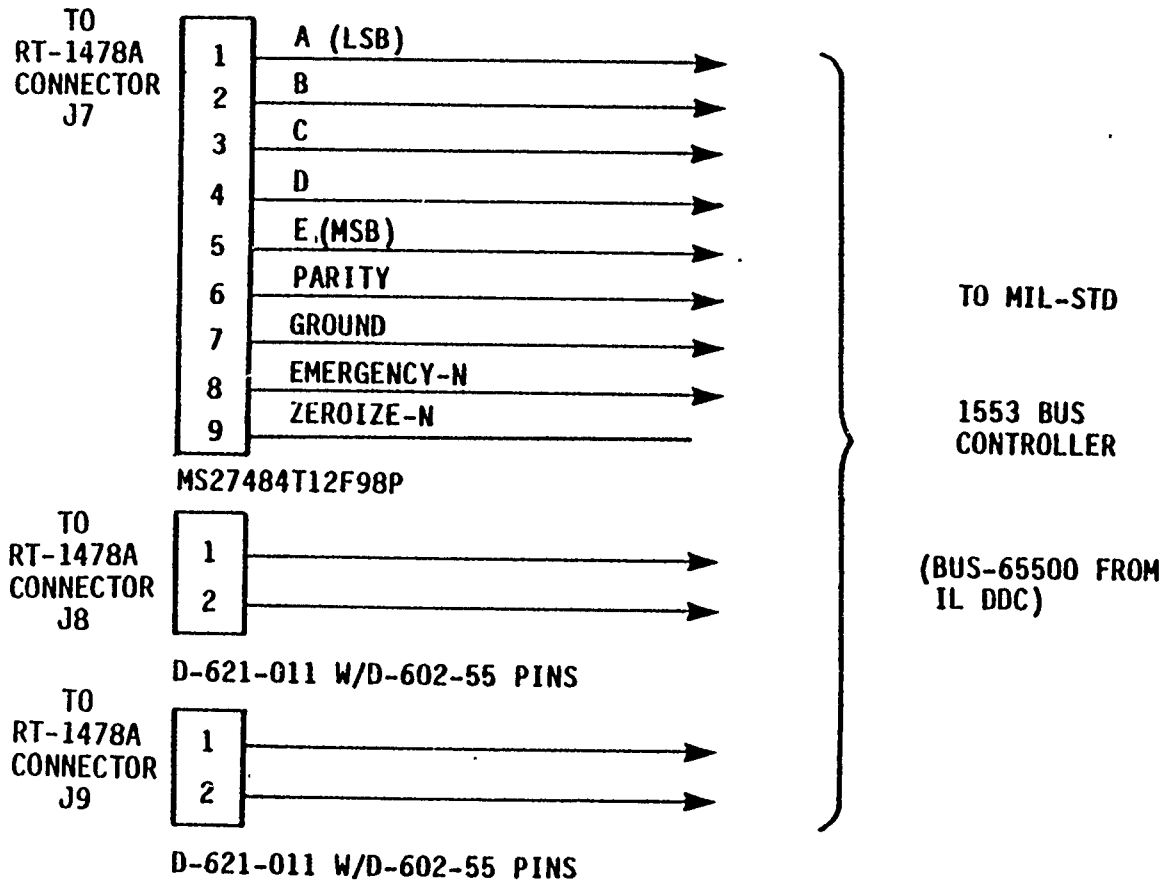
THIS CABLE IS USED TO CONNECT THE RT TO THE SDC.
EQUIVALENT GFE CABLE MAY BE UTILIZED.

Figure 4.4.1.1-2. Test Cable Set No. 2 (RT-1476A to SDC)



THIS CABLE REPRESENTS TYPICAL CONNECTIONS BETWEEN THE INTERCOM AND THE SIGNAL DATA CONVERTER AND HEADSET. THE HEADSET MODEL MAY VARY WITH AIRCRAFT TYPES AND THE ASSOCIATED WIRING MAY BE DIFFERENT. ANY GFE INTERCONNECT CABLE COMPATIBLE WITH THE INSTALLATION ENCOUNTERED MAY BE USED.

Figure 4.4.1.1-3. Test Cable No. 3 (Intercom to SDC and Headset)



THESE THREE CABLES ARE REQUIRED FOR BENCH TESTS ONLY IF AN RT-1478A IS THE UNIT UNDER TEST. THE CONNECTIONS TO THE 1553 BUS CONTROLLER SHALL BE DETERMINED AT TIME OF TEST AND ANY EQUIVALENT CABLES MAY BE USED.

Figure 4.4.1.1-4. Test Cable No. 4 (RT-1478A to MIL-STD-1553B Exerciser)

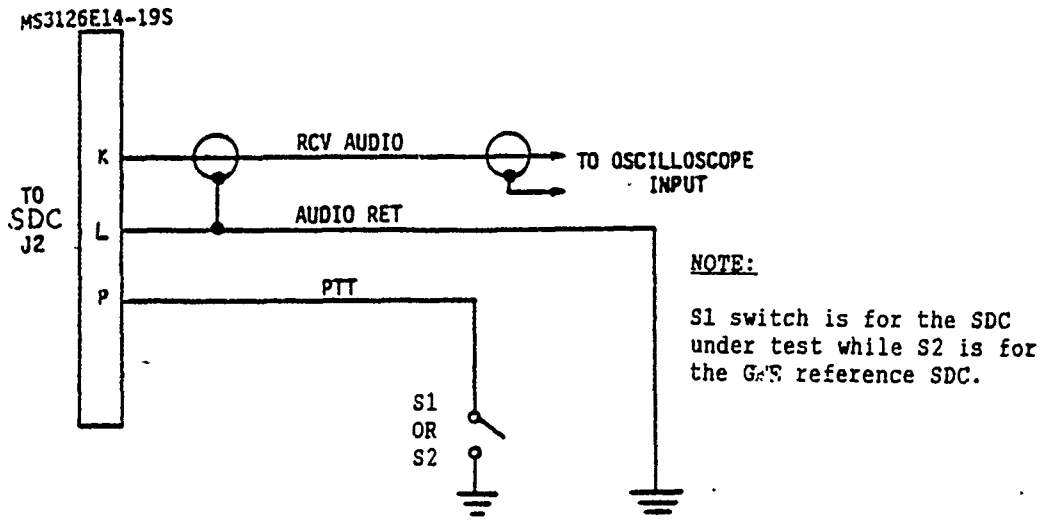
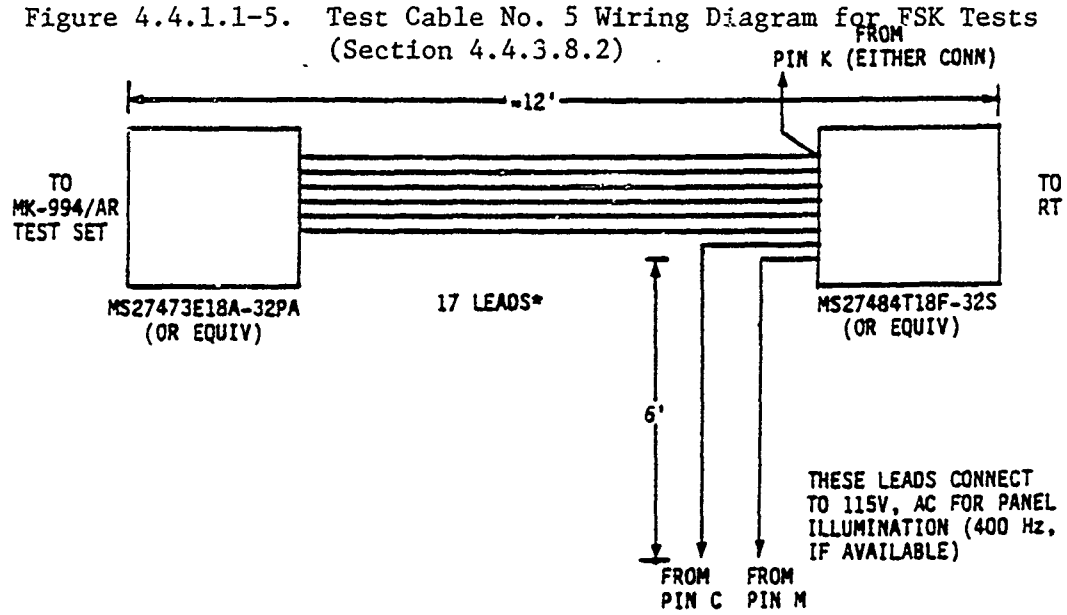


Figure 4.4.1.1-5. Test Cable No. 5 Wiring Diagram for FSK Tests (Section 4.4.3.8.2)



* WIRE FOLLOWING LEADS, PIN TO PIN:
A,B,D,E,J,K,L,P,T,U,V,a,c,d,e,g,h

NO CONNECTIONS REQUIRED TO FOLLOWING PINS:
F,G,H,R,N,W,X,Y,Z,S,b,f,j

NOTE: INSERTS ARE SAME, ORIENTATION/KEYING IS DIFFERENT

Figure 4.4.1.1-6. Test Cable No. 6 (Jumper Cable for Connecting MK994/AR System Cable, CS-10889/U, to RT System Connector J1)

4.4.3 Test Procedures. (using the MK-994/AR)

NOTE: Input levels specified throughout the following procedures are based on the use of the MK-994/AR. These signal levels include a tolerance for test equipment variations and the signal losses internal to the MK-994 (such as the 22 dB loss in received signal input and 0 3 dB of RF loss in transmitter power between the radio and the watt meter).

4.4.3.1 Equipment Setup.

a. Connect the AN/ARC-201A(V) receiver-transmitter (either the RT-1476A panel mount, the RT-1477A with C-11466A dedicated remote control unit or the RT-1478A MIL-STD-1553B bus control configuration) to the test equipment as shown in Figure 4.4.3.1-1. (For alternate power meter connections refer to Figure 4.4.3.4.1-1: for alternate transmit audio input refer to Figure 4.4.3.4.3-1.)

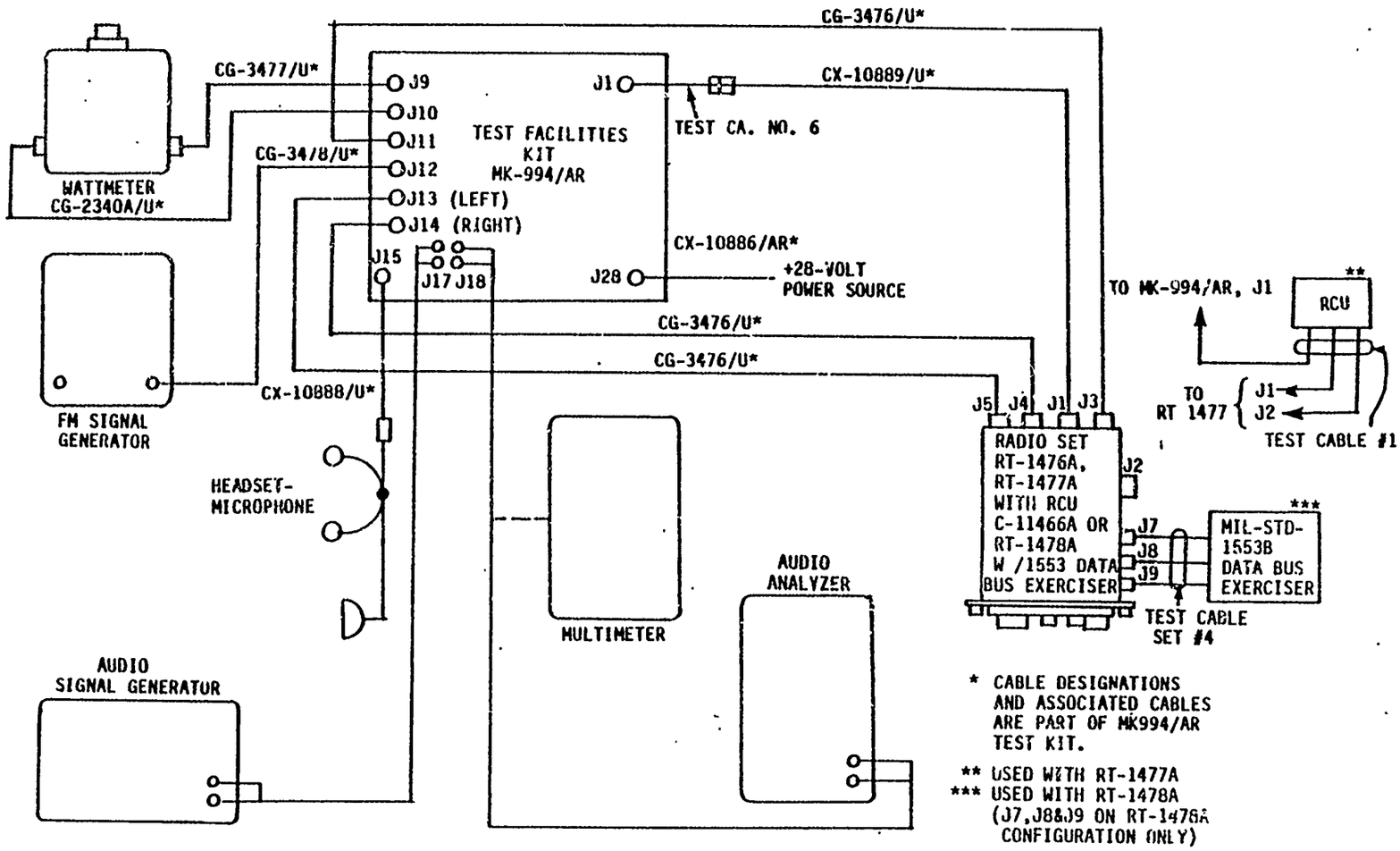
b. Place the following controls on the front panel of the MK-994/AR to the positions specified:

Control	Position
POWER DC Toggle switch	ON
RADIO ANTENNA FUNCTION selector switch	XCVR
RADIO TEST selector switch (S2)	OFF
COMM CONT NO. 1 selector switch	1 (or any position except ICS)
COMM CONT 1 VOL control	Set to a comfortable level
COMM CONT NO. 1 RECEIVER MONITOR switches	(Switch positions irrelevant)
COMM CONT TEST SWITCH	OFF
ADF TEST SWITCH	OFF
HEADSETS SWITCHES	OFF

Place the RT controls as specified (front panel controls for the Panel Mount RT or Remote Control Unit controls for the Dedicated Remote RT). (For an RT-1478A, all control functions are via the MIL-STD-1553B Data Bus Exerciser.)

Control	Position
IFM RF PWR	OFF
PRESET	MAN
MODE	SC
FUNCTION	OFF
VOLUME	As required
FREQUENCY	See test reqm's

c. Perform the following bench tests (4.4.3.2 through 4.4.3.9 in the sequence specified).



NOTE: MANY OF THE TEST INSTRUMENTS SHOWN ARE GENERIC ONLY. REFER TO INDIVIDUAL TEST CONNECTION DIAGRAMS FOR THE SPECIFIC TEST INSTRUMENTS RECOMMENDED FOR A PARTICULAR TEST.

Figure 4.4.3.1-1. System Test Setup

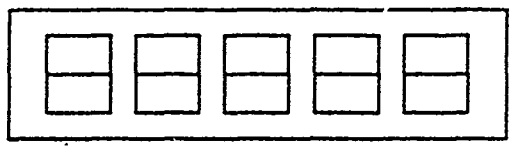
4.4.3.2 Power On. - self confidence tests

a. On the RT, set the Function switch to the TEST position.

b. Observe the Display on the RT front panel (or the Remote Control front panel).

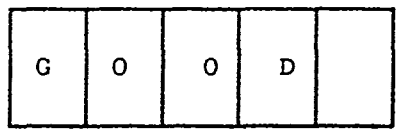
No keyboard entry is required. The display shall show 5 dashes for approximately one second.

No keyboard entry is required. The display indicates "E" and remains on for 3 seconds before progressing to automatic test steps. This is to allow time for an operator to move the switch to other positions if a complete test sequence is not desired. After 3 seconds. the display automatically changes to:



This tests the operation of all segments of all digits of the display. The display shall remain on for 3 seconds and extinguish with the RT progressing to the next automatic test step.

In the next auto test steps, the operation of the RT. the Data module, and the ECCM are verified in this order. All tests are under micro-processor control and require no additional operator action. Successful completion of all tests shall be indicated by:



"Good" shall remain on for 5 seconds and extinguish. The RT shall then be left in the receive mode as indicated by the KEYBOARD, MODE or PRESET switches. Transmitter keying is inhibited. Tests may be repeated by moving the FUNCTION switch out of the TEST position and back again.

Failures in the automatic tests shall be indicated by the word FAIL followed by a number to indicate the failed component.

NOTE: If the display flashes during the self test sequence, turn the FUNCTION switch to SQ OFF and back to TEST to restart the test sequence.

The control panel tests its own internal circuitry and the interface to the RT before commanding the RT test.

F A I L 7	Indicates failures of the interface to the RT
F A I L 8	Indicates internal failure of the control panel
F A I L 1	Indicates failure of the RT's RF receive path or modulation circuitry
F A I L 3	Indicates failure of the ECCM module

When a failure occurs, the display is immediately presented for 3 seconds. After 3 seconds (plus a .5 second delay), the 3 tests are caused to continue. The tests are continually repeated until terminated by changing the FUNCTION switch position. If several tests are failed, the display shall alternately present the results at each failed component.

4.4.3.3 Control/Programming Tests.

4.4.3.3.1 Frequency Control.

a. Operate Function switch to SQ ON.

b. Press FREQ button. Any current operating frequency shall be displayed. NOTE: In MAN, the default frequency is 30.000 MHz.

c. Press CLR button. Display shall be cleared to five underlines (_ _ _ _ _)

d. Press buttons, 3, 0, 0, 0, 0. 30000 shall be displayed.

e. Press ENT. The display shall blink indicating acceptance of the frequency as valid and the radio shall tune to 30.000 MHz.

NOTE: The FUNCTION switch does not need to be in LD to change frequencies when in MAN.

4.4.3.3.2 Preset Control.

a. Operate Function switch to LD.

b. Operate PRESET switch to 1. If any previous frequency has been preset, it will be displayed. If no previous frequency has been preset, the display shall read FILL until a frequency is entered into the PRESET according to the following steps.

c. Press FREQ. The display shall show the displays previous operating frequency.

d. Press CLR. The display shall be cleared to 5 underlines.

e. Press 3, 7, 8, 7, 5. 37875 shall be displayed. (Invalid entries will not be accepted or displayed.)

NOTE: If a mistake is made during frequency entry, pressing CLR will clear only the last digit entered to permit correction of an error. Once ENT is pressed, CLR shall clear entire display.

f. Press ENT. The display shall blink and the radio shall tune to 37.875 MHz.

g. Repeat steps b thru f for PRESET switch positions 2 thru 6 where frequencies entered are 42.975, 45.375, 49.075, 56.200, and 68.775 MHz respectively.

h. Repeat steps b thru f with PRESET switch set to CUE position. Set in a frequency of 87.975 MHz.

4.4.3.3.3 Time Command Control.

a. Press TIME button. Display may read any number between 0 and 99.

b. Press CLR. Display cleared to two underlines.

c. Press 0, 8 and ENT. The display shall blink and days 08 shall be entered.

d. Press TIME button. Display will read some previous hours and minutes separated by a space.

e. Press CLR. Display cleared to 4 underlines.

f. Press two digit buttons to represent hours in 24 hour clock and two buttons to set in minutes, e.g., 15 30 represent 3:30 PM.

g. Press ENT. Display blinks and new time keeping starts at 3:30 PM in example (seconds are zeroed with the ENT).

h. Press TIME 3 times. Alternate fields of days, hours/minutes and minutes/seconds will be displayed.

NOTE 1. The time keeping standard is the 3.2 MHz clock in the synthesizer which has a long term accuracy of +5 ppm.

4.4.3.3 4 ECCM Control.

a. Set MODE to FH.

b. Set PRESET to any position.

c. Attach MX-18290/VRC FILL Device (P1) to FILL Connector on RT. Turn power switch on FILL Device to ON (refer to appendix B for alternate device connections).

d. Set Function Switch to LD and FILL Device variable select switch to 1 (or any position which has a desired HOPSET loaded).

e. Press LOAD switch once. (Successful transfer is indicated by a "beep" in headset and hopset number indication on display. Unsuccessful transfer will result in "bad" on display and continuous tone in headset.)

f. Press Sto and a preset channel number (e.g. 1) where HOPSET is to be stored.

g. Set Function Switch to SQ ON

NOTE: The test tape must be loaded into FILL Device prior to use. Procedures for loading the MX-18290/VRC from the KOI-18/TSEC and for loading the radio directly from the KOI-18 are contained in Appendix A.

4.4.3.3.5 Panel Illumination Control. The RT-1476A front panel and the C-11466A remote control unit front panel (when used) utilize the A/C 115V, 400 Hz ac bus supply for their electroluminescent back lighting.

The 115V AC is supplied to the RT-1476A panel through pins C and M of system connector J1 and to the C-11466A panel through pins W and a of connector J1. (Test cables No. 1 and No. 6 provide access to these pins.)

To verify dimming of the panel lighting, route the 115V, 400 Hz AC via a variac to permit operator control of the AC input. Decrease the input voltage to dim the panel illumination and increase the input voltage to brighten the panel illumination. (Do not exceed the 115V maximum.)

4.4.3.4 Transmitter Tests.

4.4.3.4.1 Power Output and Sidetone Tests. (Use test setup shown in Figure 4.4.3.4.1-1)

a. Set the RT PRESET switch to MAN and MODE switch to SC (either from front panel or from remote control unit as applicable).

b. Set in a frequency of 30.000 MHz via the frequency select push buttons in accordance with 4.4.3.3.1. The display shall read 30000.

c. Set the RT IFM RF PWR switch to OFF and Function switch to SQ ON.

d. Place and hold MK-994/AR HEADSETS INTERCOM/TRANSMIT toggle switch 1 in the transmit position.

e Speak into the headset microphone and listen for audible sidetone in the headset. Adjust the volume control on the RT-1476A or the C-11466A Audio control (as applicable) for a comfortable listening level.

f. Observe an RF power indication of 10 watts. +5.8. -3.7 watts (+40 dBM ±2 dB) RECORD. (Take into account any RF attenuators and the MK-994 loss.)*

g. Release transmit switch on MK-994A.

h. Repeat steps (b) thru (g) for each of the 6 presets and the CUE position of the RT PRESET switch (frequencies of 37.875, 42.975, 45.375, 49.075, 56.200, 68.750, and 87.975 MHz).

* For alternate test setup shown in Figure 4.4.3.4.1-1, a typical loss is 30.0 dB for the attenuator plus 0.3 dB for MK-994 or a total of 30.3 dB. The meter readings or acceptable power would then be 5.9 mw to 14.8 mw.

4.4.3.4.2 Frequency Check.

NOTE: (1) If RT has been on for at least 1 minute, continue with test. If not, wait 1 minute before continuing.

(2) Unkey transmitter when changing frequencies.

a. Connect the AN/ARC-201A(V) RT (either configuration) to the test equipment as shown in Figure 4.4.3.4.2-1.

b. Set the RT PRESET switch to MAN and verify a frequency of 30.000 MHz on display. (If frequency is not 30.000, set it using the push buttons). This is f_o (center frequency).

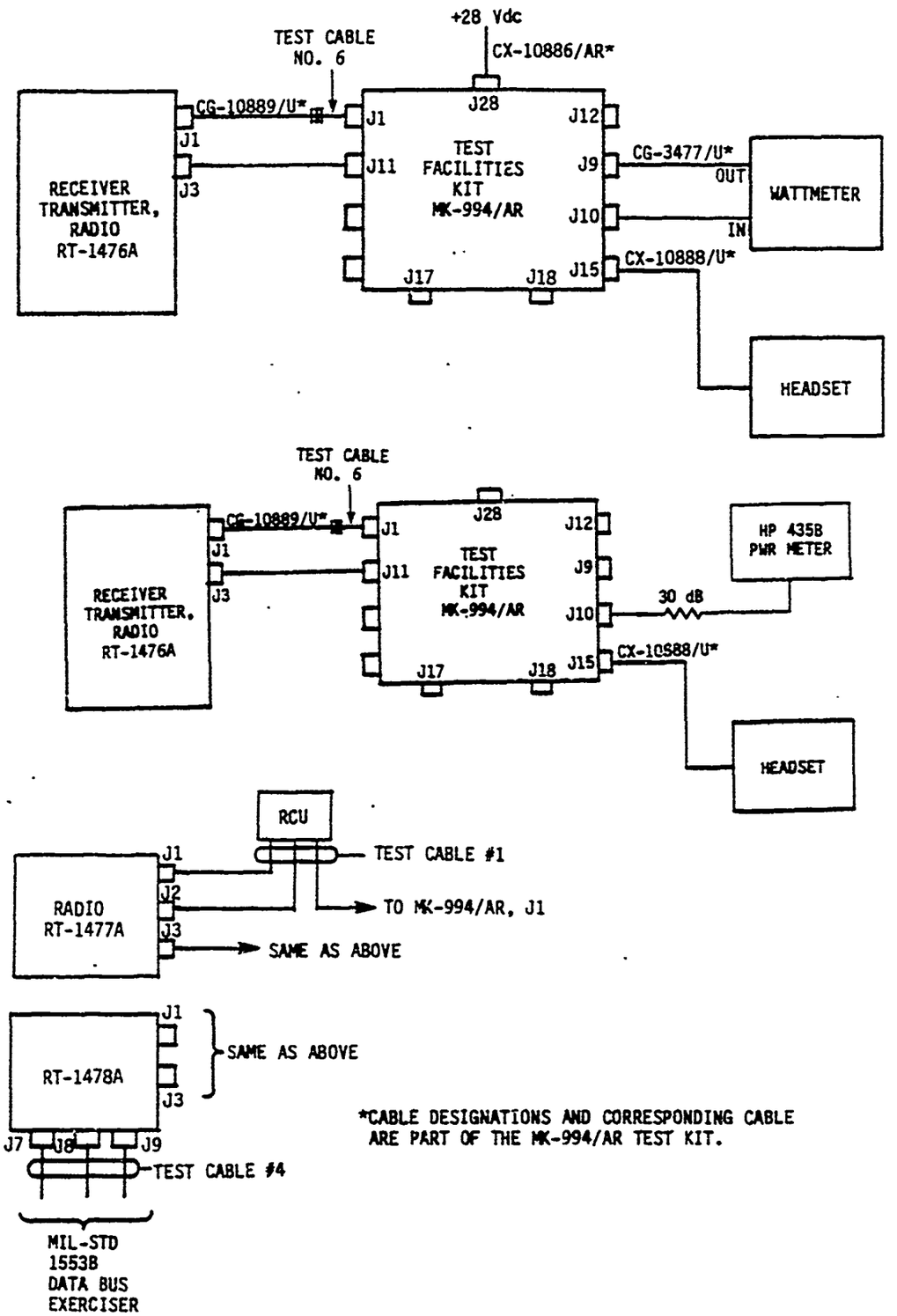


Figure 4.4.3.4.1-1. Sidetone and Power Output Test

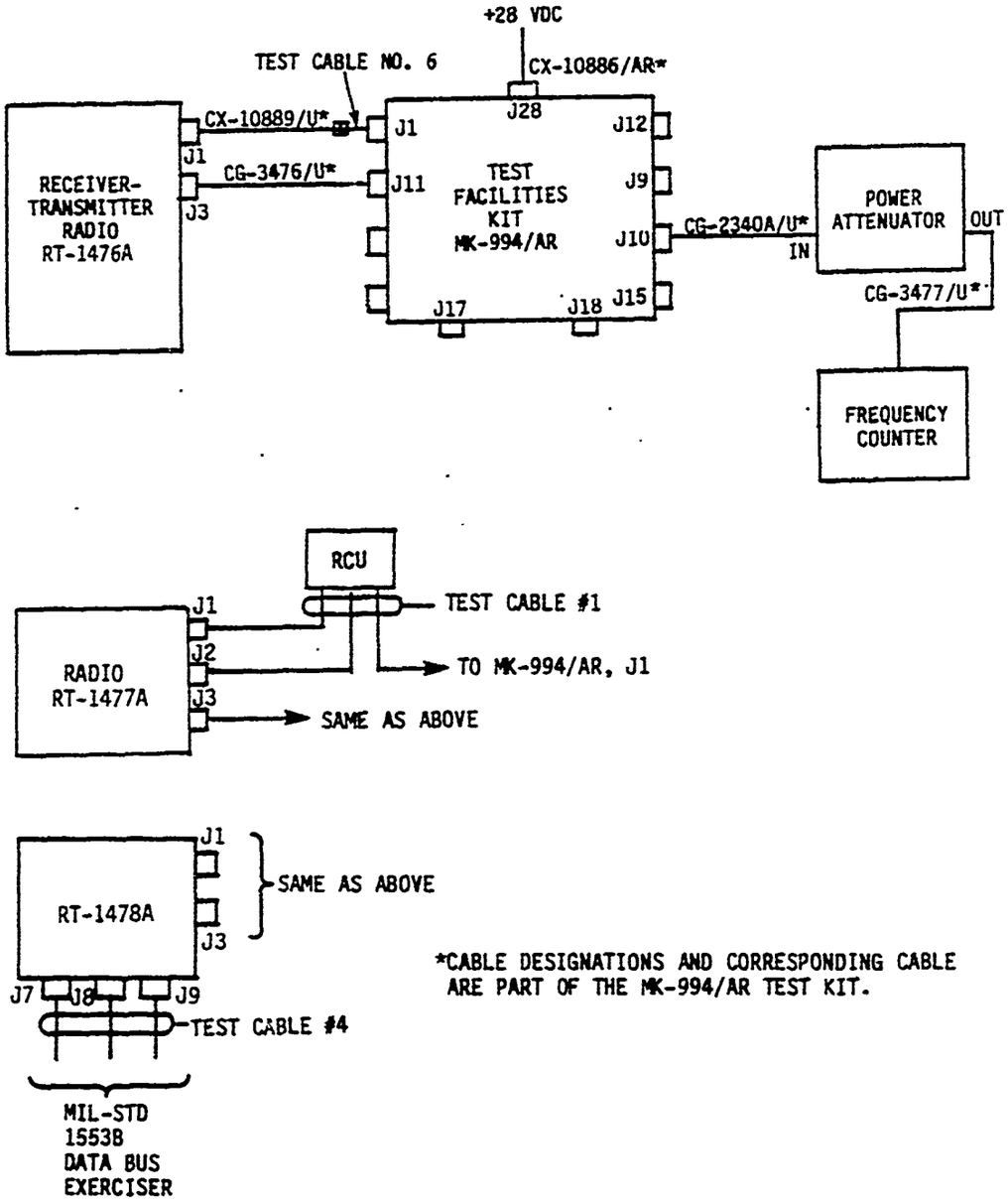


Figure 4.4.3.4.2-1. Frequency Check

c. Place MK-994/AR HEADSETS INTERCOM/TRANSMIT toggle switch 1 in the TRANSMIT position (or test switch in position 4).

d. Observe the frequency counter.

e. Calculate the frequency error. (The difference between the frequency displayed on counter and the frequency set in on RT switches.)

f. The observed frequency is to be fo ± 15 PPM (29.999.550 to 30,000,450 Hz).

g. Repeat steps (b) and (d) thru (f) for frequencies of 37.875, 42.975, 45.375, 49.075, 56.200, 68.775 and 87.975 MHz (preset frequencies). (The readings shall be as follows:

Nominal freq.	Acceptable freq. limits
37.875 MHz (Preset 1)	37.874,432 to 37.875.568 Hz
42.975 MHz (Preset 2)	42,974,355 to 42.975.645 Hz
45,375 MHz (Preset 3)	45,374,319 to 45,375.681 Hz
49,075 MHz (Preset 4)	49,074,264 to 49.075.736 Hz
56.200 MHz (Preset 5)	56,199,157 to 56,200.843 Hz
68,775 MHz (Preset 6)	68,773,968 to 68,776.032 Hz
87,975 MHz (Preset Cue)	87,973,681 to 87.976.319 Hz

NOTE: Release the MK-994/A transmit toggle switch No. 1 after each series of tests.

4.4.3.4.3 RF Carrier Deviation Test.

a. Verify the following RT contrcl settings:

1) PRESET	MAN
2) FREQUENCY	30000
3) MODE	SC
4) IFM RF PWR	OFF

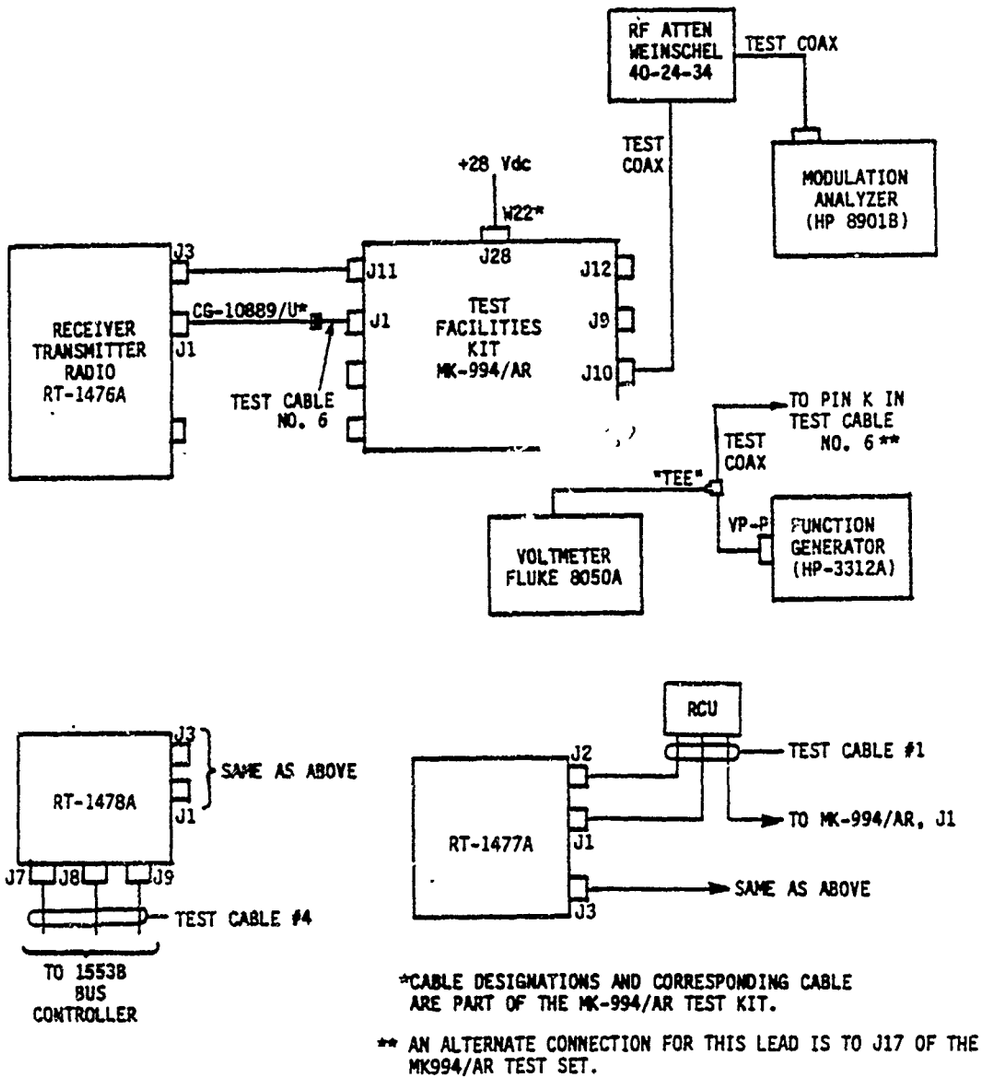
b. Verify the following MK-994/AR control settings:

1) Radio Antenna Function SW	XCVR
2) Radio test selector sw	Place in position 4 when "keying" is desired.*
3) Comm Cont. No. 1 sel sw	1 (or any position except ICS)

c. Connect equipment as shown in Figure 4.4.3.4.3-1.

d. Set the controls on the Function Generator (HP-3312A) as follows:

1) Range Button:	100
2) Range Dial:	10
3) Function Button:	Sine Wave



*CABLE DESIGNATIONS AND CORRESPONDING CABLE ARE PART OF THE MK-994/AR TEST KIT.

** AN ALTERNATE CONNECTION FOR THIS LEAD IS TO J17 OF THE MK994/AR TEST SET.

Figure 4.4.3.4.3-1. RF Carrier Deviation Test

Adjust the generator's amplitude vernier for a nominal 387 mVrms indication on the voltmeter (Fluke 8050A). Make this adjustment with the RT in transmit mode or "keyed". If the alternate test set-up on Figure 4.4.3.4.3-1 is used, the nominal generator output is 530 mVrms and the adjustment is very critical. (The connection to pin K is therefore the preferred choice.)

* Place switch in position 3 and "key" with HEADSETS INTERCOM/TRANSMIT toggle switch 1 (see section 4.4.3.4.1d) if alternate test connections shown in Figure 4.4.3.4.3-1 are utilized.

e. Set the controls on the Modulation Analyzer (HP-8901B) as follows:

   1) HP Filter: 50 Hz
   2) LP Filter: 15 kHz
   3) Depress the automatic operation key.

f. Depress the peak (+) key on the modulation analyzer and the FM measurement button.

g. Key the transmitter and observe and record (on the test data sheet) the modulation deviation displayed on the modulation analyzer. Depress the peak (-) key and record the deviation. Add the peak (+) and peak (-) deviations. The required pp deviation is 16 to 22 kHz p-p (includes squelch tone).

h. Unkey the transmitter (test switch to any position except 4 or 8). Alternate: Release HEADSET transmit switch 1.

i. Set the RT preset Switch to Preset 1 (37.875 MHz), key the transmitter and record the indicated deviation as in step g above. Unkey the transmitter.

j. Repeat step i for the remaining preset frequencies of 42.975, 45.375, 49.075, 56.200, 68.775, and 87.975 MHz.

4.4.3.5 Receiver Tests.

4.4.3.5.1 Analog Sensitivity.

a. Verify control settings for RT as follows:

IFM RF PWR	OFF
PRESET	MAN
FUNCTION	SQ OFF
MODE	SC
FREQ DISPLAY	30000

b. Verify the control settings for MK994/AR as follows:

Radio ant. function	XCVR
Radio test	6
Comm Cont. No. 1 sel. sw	1(any position except ICS)
Headsets/Intercom switches	OFF
Comm Cont. No. 1 toggle switches	OFF
Comm Cont. Test sw	OFF
ADF switches	OFF

c. Connect the equipment as shown in Figure 4.4.3.5.1-1.

d. On the 8903A audio analyzer, set the source frequency to 1 kHz.

e. Adjust the FM signal generator to 30.000 MHz; FM external modulation (AC); deviation ±6.5 kHz by adjusting the 8903A audio amplitude as required; output level of approximately -77 dBm. NOTE: The 8903A audio amplitude can be stepped up or down with the arrow buttons after the AMPTD button is depressed. The size of the steps is adjusted with the AMPTD INCR button and the keyboard numbers.

f. Disable 8903A HP filters, activate 30K LPF.

g. Using the RT or RCU volume control, adjust the audio output level (volume) of the RT for 1 Vrms nominal. Press S and SINAD buttons on the 8903A.

h. Adjust signal generator output level until a 10 ± .5 dB SINAD is obtained. (The level shall be ≤-105 dBm at the radio input). (≤-83 dBm at the signal generator output)

i. Repeat steps d thru h (as applicable) for RT PRESETS 1 thru 6 plus CUE. The frequencies will be 37.875, 42.975, 45.375, 49.075, 56.200, 68.775 and 87.975 MHz.

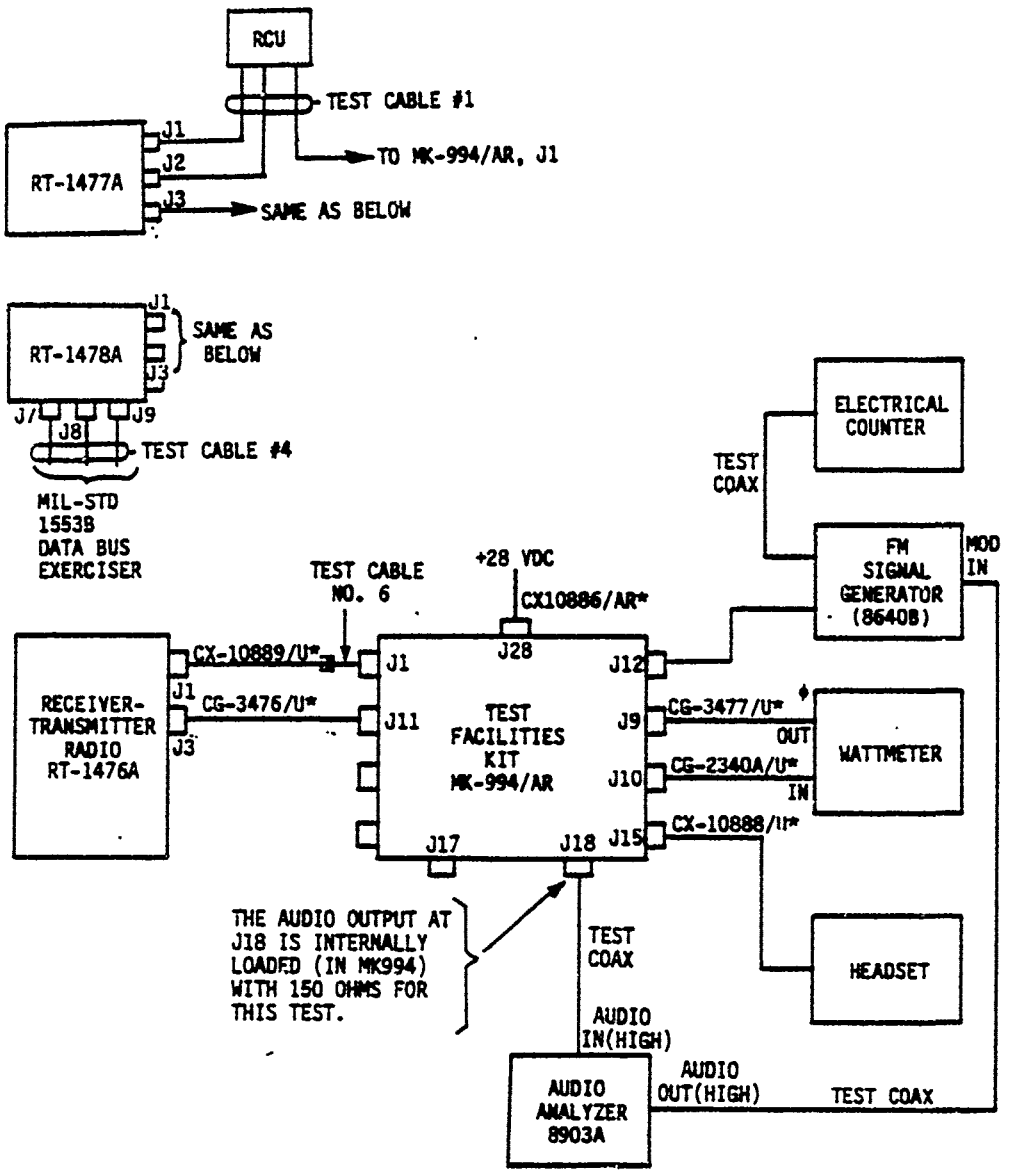
4.4.3.5.2 Squelch and Volume Control Tests.

a. Connect equipment as shown in Figure 4.4.3.5.2-1 (see Figure 4.4.3.5.2-2 for audio combiner network details).

b. Set PRESET to MAN (30 MHz) and Function to SQ ON.

c. Set the signal generator to 30.000 MHz, modulation at FM. EXT (AC).

d. With function generator #1 off, set function generator #2 for 1 kHz and adjust its output level to obtain 6.5 kHz deviation on the signal generator (with the signal generator output connected to 8901 mod meter set to display for FM deviation).



*CABLE DESIGNATIONS AND CORRESPONDING CABLE ARE PART OF THE MK-994/AR TEST KIT.

♦ SEE FIGURE 4.4.3.4.1-1 FOR ALTERNATE POWER METER CONNECTION

Figure 4.4.3.5.1-1. Receiver Sensitivity Tests

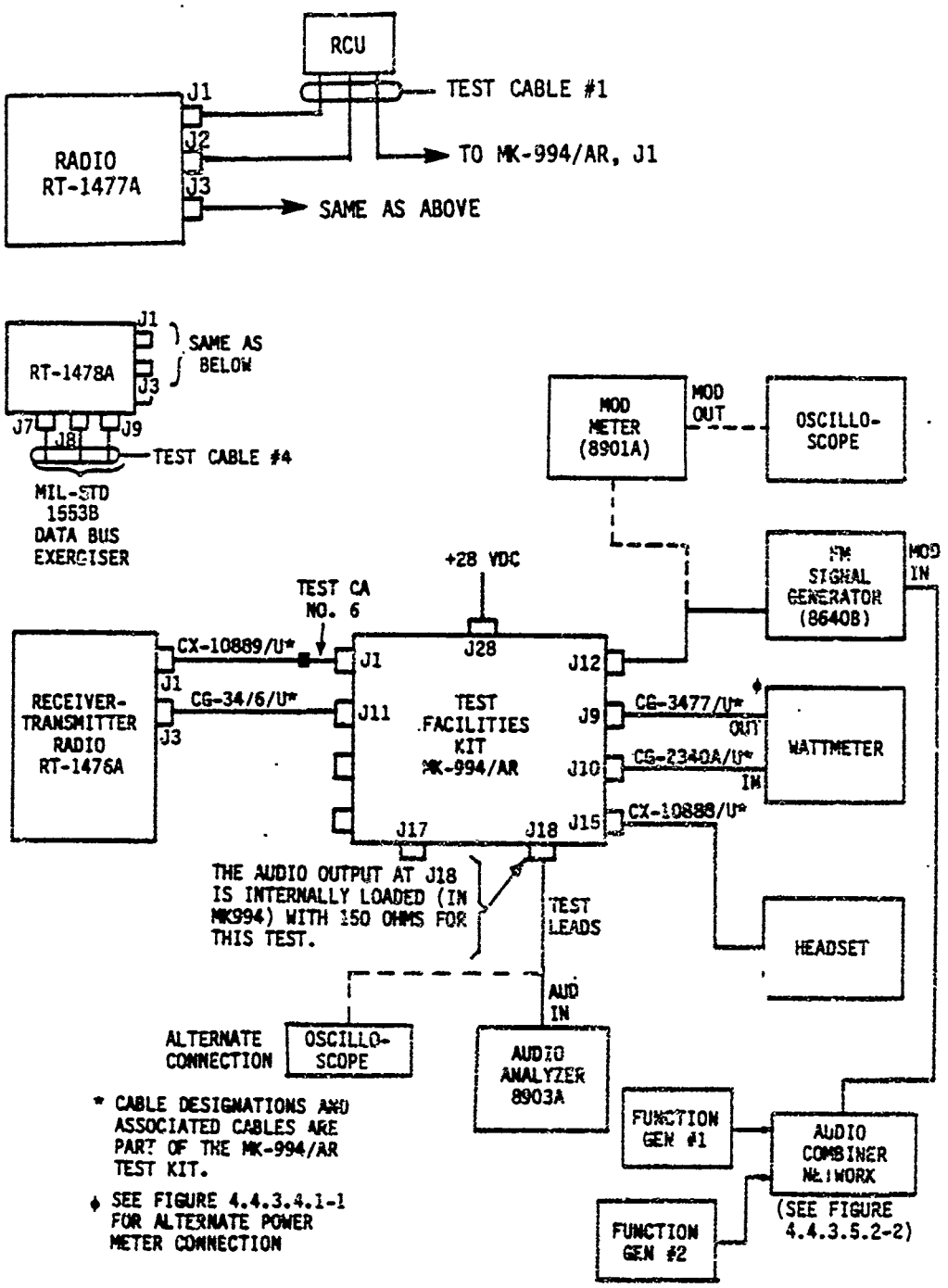


Figure 4.4.3.5.2-1. Receivor Squelch Tests

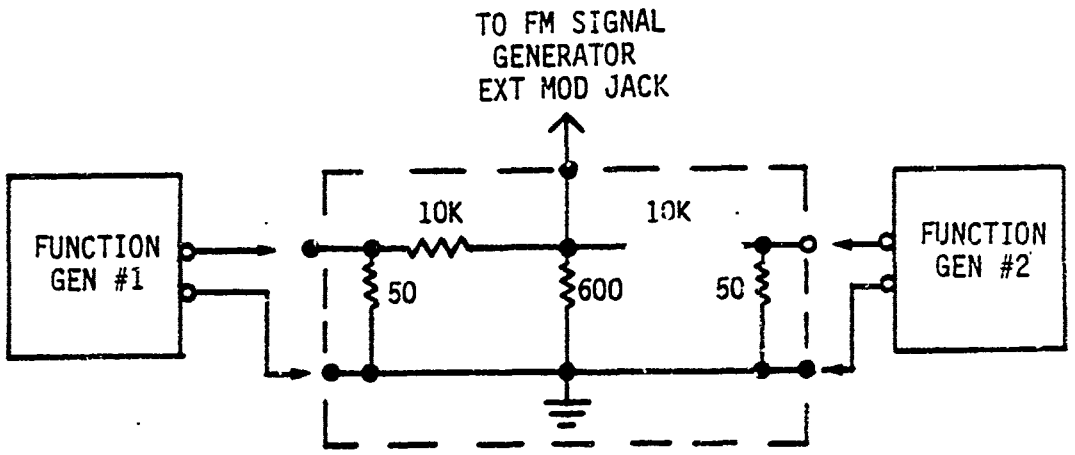


Figure 4.4.3.5.2-2. Audio Combiner Network (Locally Manufactured)

e. With function generator #2 off, set function generator #1 for 150 ±3 Hz and adjust its level to obtain 3 kHz deviation on the signal generator. (See step d.) (NOTE: The 150 Hz must be held within its stated tolerance.)

f. Turn both function generators on for a combined 150 Hz and 1 kHz modulation of the signal generators (with the combined displayed deviation between 8 and 9.5 kHz).

g. Set the signal generator output level to -103 dBm and connect to J12 on the MK 994/AR.

h. With test switch on the MK 994/AR in position 6, measure the audio level out of the RT at J18 of the MK-994/AR test set with the audio analyzer. In lieu of using the audio analyzer, the audio can be viewed on an oscilloscope as shown in Figure 4.4.3.5.2-1.

i. Increase the signal generator level slowly until the squelch breaks. The audio output level is to be greater than .5 volts. Record.

j. Decrease the signal generator level until the squelch returns. The audio output level is to be less than 0.5 volts. Record.

k. The radio shall break squelch at ≤-115 dBm.

l. Set PRESET to 5 (56.2 MHz).

m. Repeat Steps c thru k (as applicable) for a frequency of 56.200 MHz.

n. Increase signal generator level to -22 dBm.

o. Vary the audio control on the RT (or remote control unit) over its control range. The audio output level shall vary over a 35 to 40 dB range with minimum at ccw end and maximum at cw end of control rotation (nominal RT output is +17 dBm (50 mW). (Range is approximately 2.5 μW to 50 mW.) [It may be desirable to measure the audio level with a Fluke 8050 (or equivalent) set on the 20V range.]

4.4.3.6 Homing Tests.

a. Connect the equipment as shown in Figure 4.4.3.6-1. (RF path losses in the MK-994/AR are compensated for with the RF signal generator output level settings listed.)

b. On the MK-994/AR, set the radio test switch to position 8 and radio antenna function switch to HOMING BALANCE.

c. On the RT, set the mode switch to HOM.

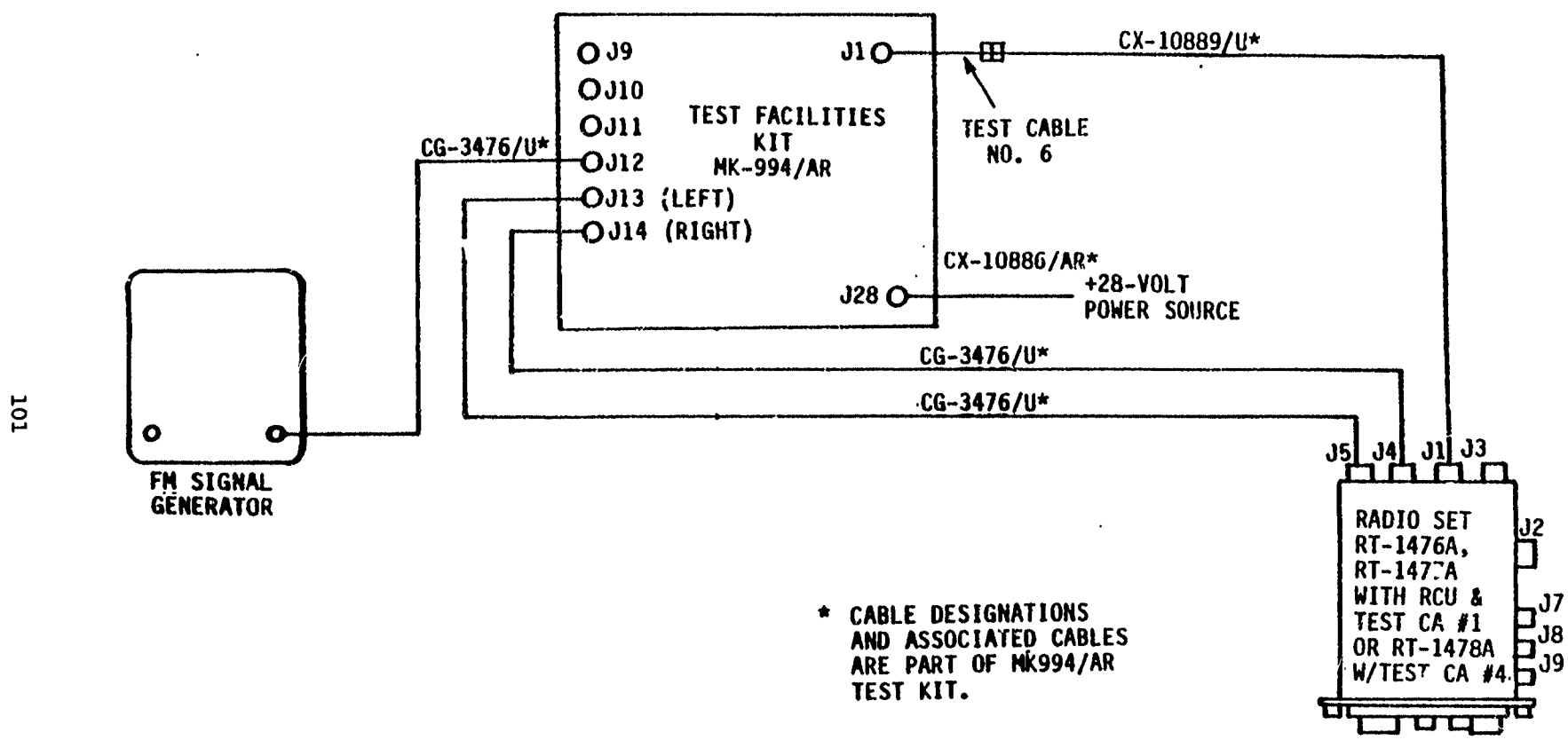


Figure 4.4.3.6-1. Test Setup for Homing Tests

d. Set the signal generator (connected to J12 of the MK-994/AR) to Preset No. 3 (45.375 MHz) at a -84 dBm output level (-112 dBm at homing antennas). Signal generator can be either modulated or unmodulated for these tests.

e. Increase the signal generator level until the signal strength flags on the MK-994/AR homing meter flip to all solid color. This should occur between -85 and -65 dBm (-113 and -93 dBm at RT).

f. Increase the signal generator signal level to -2 dBm (-30 dBm at RT). The station approach indicator on the homing meter should be positioned at the bottom of its range (goes from top to bottom as the RT's signal is increased from approximately -80 to -2 dBm). (Appproximately -108 to -30 dBm at the RT.)

g. Set the ANTENNA FUNCTION switch on the MK-994/AR to the HOMING RIGHT position (signal from signal generator to J12 is 3 dB greater than signal to J13).

h. The steering indicator pointer shall point to the extreme right position on the MK-994/AR homing meter.

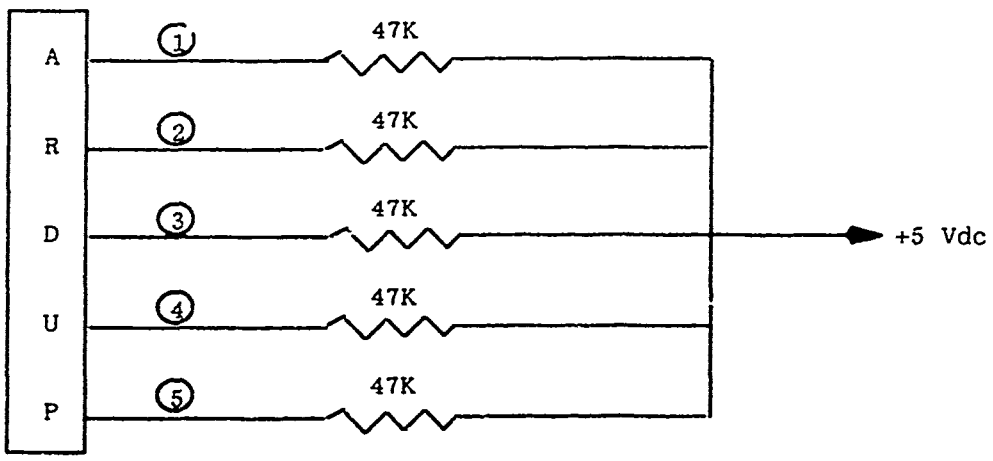
i. Set the ANTENNA FUNCTION switch on the MK-994/AR to the HOMING LEFT position.

j. The steering indicator shall point to the extreme left position.

4.4.3.7 Verification of IFM AM-7189A Amplifier Control Signals.

a. Use test set-up for transmitter power output and sidetone tests (Figure 4.4.3.4.1-1).

b. Connect a resistive network as shown to the designated pins at the RT Ancillary connector (J2).



①, ②, ③, ④, ⑤ are voltmeter test points.

c. On the RT, set MODE to SC, FUNCTION to SQ OFF, PRESET to MAN (30.000 MHz), IFM RF PWR to OFF.

d. On the MK-994/AR, set RADIO ANT FUNCTION to XCVR, TEST to 1, COMM CONT No. 1 selector to 1, COMM CONT No. 1 RECEIVER MONITOR switched to OFF, COMM CONT test switch, ADF test 8 switch, and HEADSET switches to OFF.

e. Key the transmitter by placing the MK-994/AR HEADSETS INTERCOM/TRANSMIT toggle switch 1 to transmit position.

f. Speak into the headset microphone and verify the presence of a sidetone signal (adjust volume control for sidetone level). Release "key" switch.

g. Set IFM RF PWR switch to LO; then to NORM; then to HI (unkey before changing settings). In each position, "key" the transmitter.

h. Note the absence of sidetone for each of the switch settings of step g.

i. Set IFM RF PWR switch to OFF and "key" the transmitter.

j. Monitor each of the test points (TPs) of step (b) with a voltmeter. The voltage readings shall be +5 volts for test points (1), (2), and (3) and 0V for TPs (4) and (5).

k. Unkey the transmitter and monitor each of the five test points. The voltage readings shall be +5 volts for TPs (1), (2), (3), and (5) and 0V for TP (4).

l. Set the IFM RF PWR switch to LO and monitor the 5 test points. The voltage readings shall be +5 volts for TPs (1), (3) and (5) and 0V for TPs (2) and (4).

m. Set the IFM RF PWR switch to HI and monitor the 5 TPs. The voltage readings shall be +5 volts for TPs (3) and (5) and 0 volts for TPs (1), (2), and (4).

n. Set the IFM RF PWR switch to NORM and monitor the 5 TPs. The voltages shall be +5 volts for TPs (2), (3), and (5) and 0V for TPs (1) and (4).

o. Set the MODE switch to FH and monitor the 5 TPs. The readings shall be +5 volts for TPs (2) and (5) and 0V for TPs (1), (3), and (4).

p. Set the MODE switch to SC and set in a frequency of 62.000 MHz with frequency buttons (refer to section 4.4.3.3.1 for entering a new frequency in MAN position). Monitor the 5 TPs. The voltages shall be +5 volts at TPs (2), (3), (4), and (5) and 0V at TP (1).

q. Reset frequency to 30.000 MHz.

4.4.3.8 Single Channel System Tests. For these tests, a second RT (GFE) and two each Signal Data Converters (SDC) will be required. In addition, two handsets (H-250/U) or two intercoms (C-6533) equipped with headsets (H-157/AIC or H-101/AIC) are required.

4.4.3.8.1 Plain Text Voice.

a) Connect the equipment as shown in Figure 4.4.3.8.1-1.

b) On each RT, set the following switches:

1) PRESET	MAN
2) FREQ	30.000 MHz (no offset)
3) MODE	SC
4) FUNCTION	SQ ON
5) IFM RF PWR	OFF

c) On each SDC, fill the variable locations as described in Appendix A, and set the following switches.

1) MODE	PT
2) VAR	1
3) DATA RATE	TF
4) "*"	OFF

d) If intercoms are used, set all toggle switches to OFF and set rotary switch to position 5.

e) With one operator at RT #1 (UUT) Headset/Handset and a second operator at RT #2, proceed as follows:

1) Opr. #1 to operate PTT on handset and speak into microphone #1.
2) Opr. #2 should hear the voice signal of Opr. #1 in the #2 headset.
3) Repeat for Opr. #2 transmitting to Opr. #1.

4.4.3.8.2 Cipher Text Mode.

a) On each SDC, set MODE to the RMT/CT position.

b) Repeat (e) of 4.4.3.8.1 above to verify CT voice communication.

4.4.3.8.3 Frequency Shift (FSK).

a) Connect the equipment as shown in Figure 4.4.3.8.2-1.

b) On each RT, set the following switches:

1) PRESET	MAN
2) FREQ	30.000 MHz (no offset)
3) MODE	SC
4) FUNCTION	SQ ON
5) IFM RF PWR	OFF

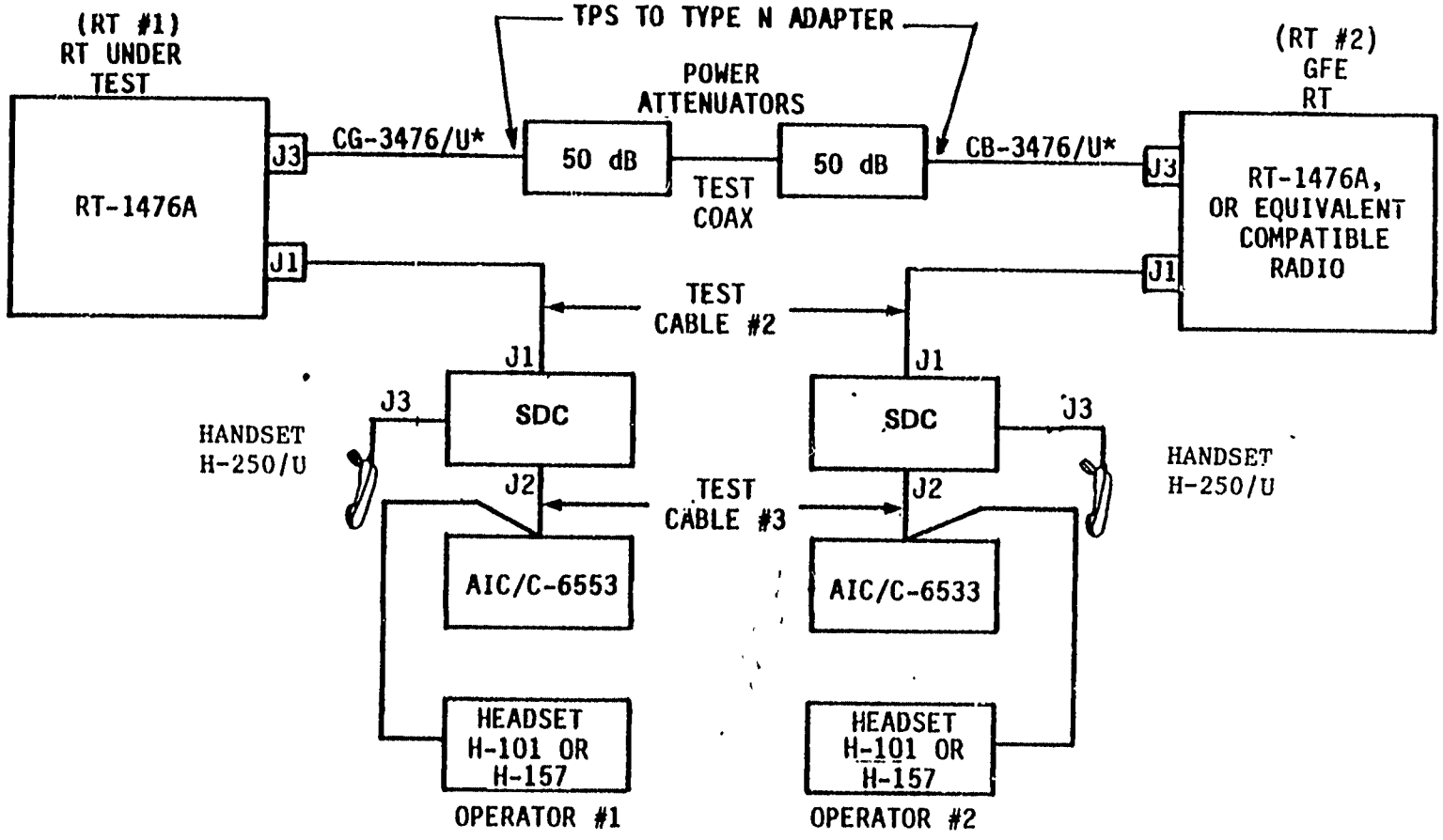


Figure 4.4.3.8.1-1. Systems Tests - Plain Text SC/FH

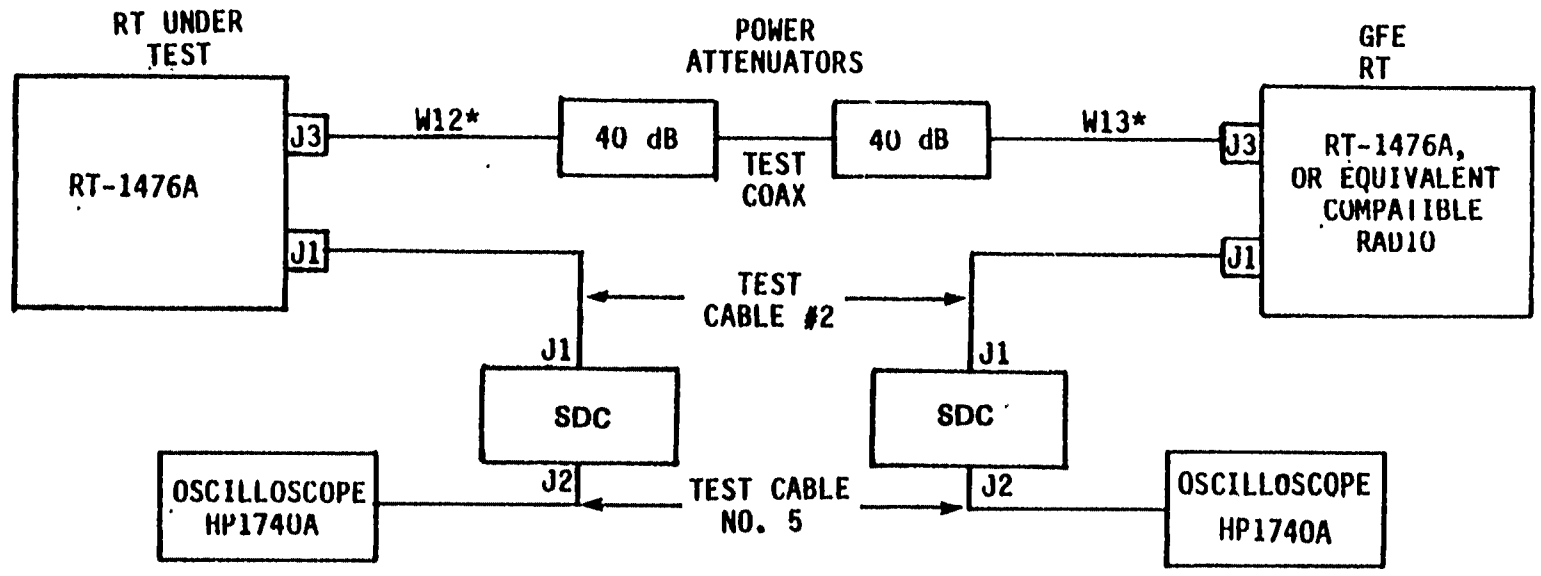


Figure 4.4.3.8.2-1. System Tests - Single Channel FSK

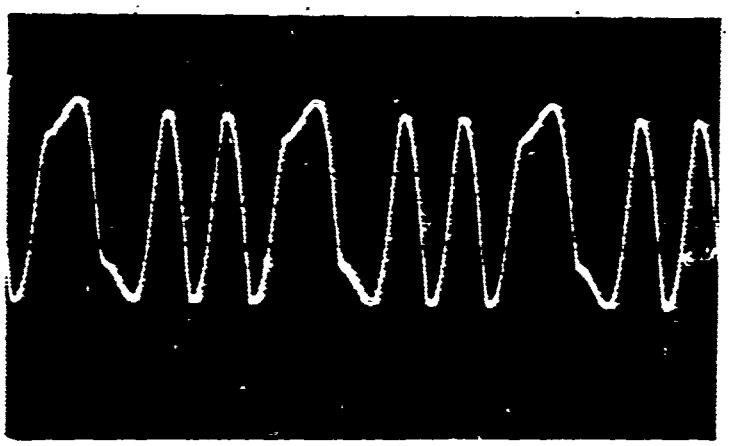
c) On each SDC, set the following switches:

1) MODE	PT
2) VAR	1
3) DATA RATE	TF
4) "*"	OFF

d) Connect the oscilloscope to SDC #2 (REF), and set the oscilloscope controls as follows:

1) Time Base:	0.5 ms/Div
2) Amplitude:	1V/Div

e) Set SDC #1 (UUT) to TEST mode. This will enable an internal FSK signal. After completion of Built-in-Test (BIT), activate the handset/headset PTT to transmit the digital message.



f) Observe the following waveform at SDC #2.

g) Connect the oscilloscope to SDC #1.

h) Set SDC #1 to PT mode, and set SDC #2 to TEST mode.

i) After completion of BIT, activate PTT of SDC #2 and observe the wave form in (f) above at SDC #1.

j) On each SDC, set MODE to the RMT/CT position.

k) Repeat steps (d) through (i) for Cipher Text FSK operation.

4.4.3.9 Frequency Hop System Test (Plain Text Voice).

a. For this test, the following additional equipment is required:

(1) KOI-18/TSEC Tape Reader w/test tapes. Test tapes to be obtained from procuring activity.

(2) FH Sets MX-18290 Fill Device (or equivalent). The procedures for loading the MX-18290 from the KOI-18/TSEC and for loading the radio directly from the KOI-18/TSEC are contained in Appendix A.

NOTE: Use of the KOI-18/TSEC for loading the RT-1478A is not recommended. The RT-1478A is 1553B Bus Controlled and the KOI-18 is manually controlled. Due to the inherent timing differences resulting from these separate methods of control, it is difficult to achieve consistent loading results. It is, therefore, recommended that only the MX-18290 Fill Device (or equivalent) be used to load the RT-1478A.

b. Connect equipment as shown in Figure 4.4.3.8.1-1.

c. On each RT, load hopsets, as follows:

1) Set MODE to FH

2) Set PRESET to any position (1 through 6)

3) Attach the MX-18290/VRC FILL device (P1) to FILL connector on the RT and turn FILL device power switch to ON. (Refer to Appendix B for alternate device connections.)

4) Set FUNCTION switch to LD and FILL device variable select switch to 1 or to any position which has a desired hopset loaded.

5) Press LOAD switch once (refer to 4.4.3.3.4.g for transfer criteria).

6) Press Sto and the number of RT channel where the hopset is to be stored, e.g. 1.

7) Synchronize time on the two RTs according to established practice for entering in time (section 4.4.3.3.3).

NOTE: Each RT which is to be operated in an ECCM net must set the same date and hour/minute according to the instructions of 4.4.3.3.3. The final STO of step g must be performed on all RTs within a four second maximum time gate for FH synchronization purposes. Communication among RT operators is essential to accomplish the time synchronization.

8) Set FUNCTION switch to SQ ON

d. Repeat the communication test operation of 4.4.3.8.1(e)(1) thru (e)(3).

4.5 Preflight Tests. Preflight tests shall be conducted at a location which is free of electromagnetic energy reflecting surfaces such as buildings, other aircraft, etc., and where the electromagnetic environment level is not more than 4 dB above the receiver internal background level. Any test site which does not meet these requirements shall not be utilized without prior approval of the procuring activity. Frequency allocations must be approved by FAA and FCC agencies.

The following tests will be conducted during preflight check-out. Each shall be checked off after performance or a note listing why the test could not be performed or was not successful shall be entered.

1) Dc voltage test under A/C loading

2) Receiver Tests
   a) Reception at 30.000 MHz
   b) Reception at 37.875 MHz
   c) Reception at 42.975 MHz
   d) Reception at 45.375 MHz
   e) Reception at 49.075 MHz
   f) Reception at 56.200 MHz
   g) Reception at 68.775 MHz
   h) Reception at 87.975 MHz

3) Transmitter tests
   a) Forward power at 10 watts
   b) VSWR within limits

4) Equipment Interference Tests
   - No degrading interference response

5) Communication with a Ground radio (SC)
   a) SC/PT operation verified
   b) Volume control verified
   c) Sidetone verified

   With an SDC installed:
   d) SC/CT operation verified
   e) SDC CT volume control verified

6) Communication with a Ground radio (FH)
   a) FH/PT operation verified
   b) No degrading interference response
   c) Sidetone verified

   With an SDC installed:
   d) FH/CT operation verified
   e) No degrading interference response
   f) CT sidetone verified

7) Retransmission tests (SC/PT)
   - Capability verified

4.5.1 Electrical Power Source. With all electrical equipment which is connected to the same bus as the AN/ARC-201A(V) turned ON and operating in the normal manner (if an SDC is installed it should be operating in PT mode), place the AN/ARC-201A(V) in the transmit mode of operation. Under this condition, measure the DC input voltage level at pin D of connector J1. The voltage shall be between +24 and +29 Vdc.

4.5.2 Test Equipment Required. A compatible SINCGARS type Ground or Aircraft radio is required as a ground reference system for the preflight communication test of the AN/ARC-201A(V). If the system under test is configured with an SDC, the reference Ground SINCGARS equipment must be of the ICOM type (RT-1523/VRC) or be equipped with a KY-57 (or compatible COMSEC device), and the Aircraft SINCGARS equipment must be equipped with an SDC or KY-58. An RF thru-line wattmeter is also required. If a non-SINCGARS radio is used, a deterioration of communication quality may occur due to a difference in FM deviation utilized in the two radios.

4.5.3 Receiver Tests.

a. Set the RT-1476A front panel controls, RT-1477A/C-11466A, remote unit panel controls, or RT-1478A data bus controls to accomplish the following:

IFM RF PWR	OFF
PRESET	MAN
FREQ	30.000 MHz
FUNCTION	SQ ON
MODE	SC
VOL	As required

b. If an SDC is installed, set the front and rear switches to the following:

MODE	PT
VAR	1
RATE	TF
"*"	OFF

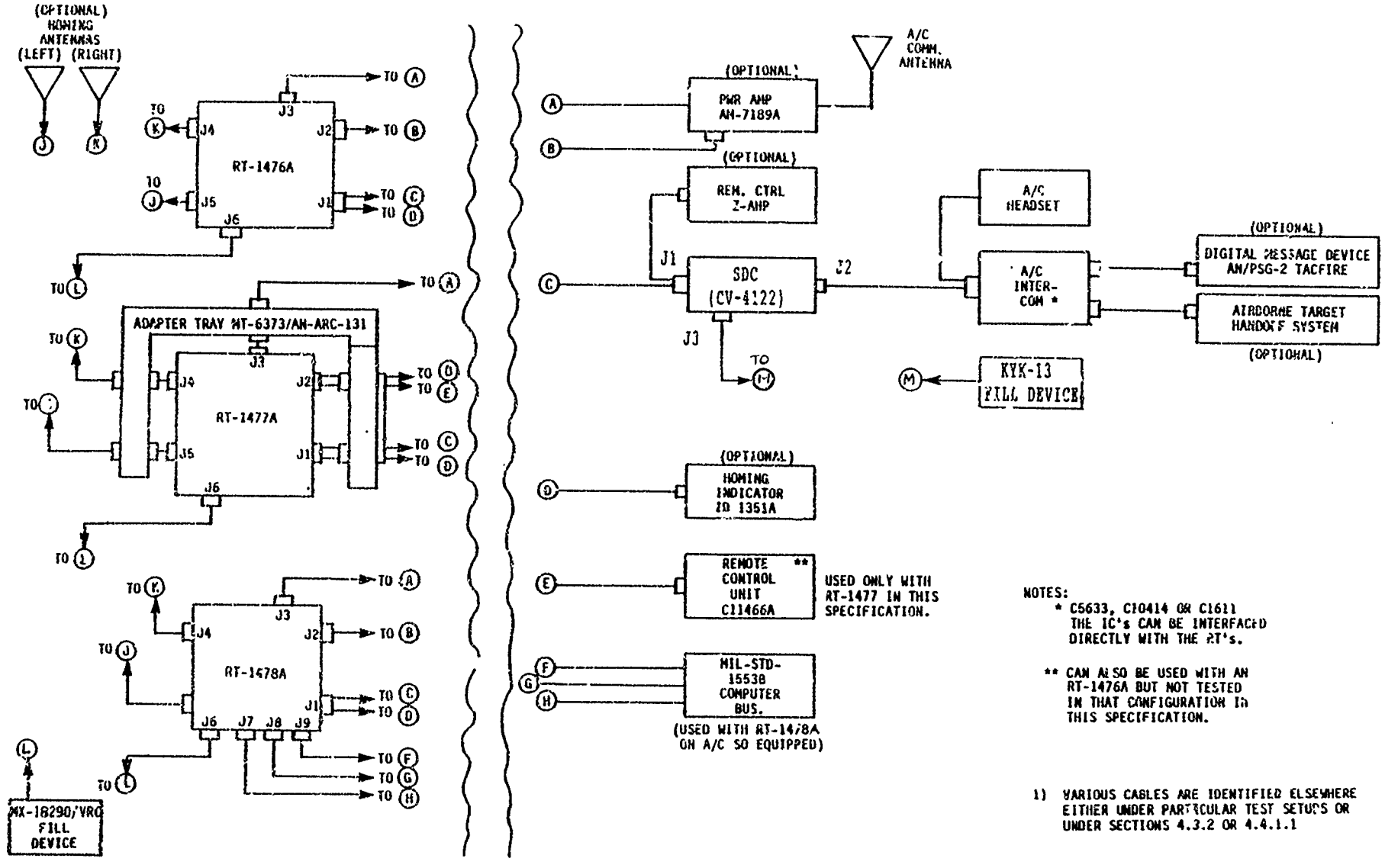
c. Connect the equipment for the RT (and optional SDC) under test as shown in Figure 4.5.3-1.

d. For the ground station, select a 30.000 MHz frequency and key the transmitter. Operate at the lowest RF output power available. Speak into the microphone.

e. Verify the receiver under test by monitoring the reception in the headset.

f. Repeat steps c and d at PRESET frequencies of 37.875, 42.975, 45.375, 49.075, 56.200, 68.775 MHz and at CUE frequency of 87.975 MHz.

NOTE: It is assumed that the six presets and the CUE frequency have been previously set in both RT's according to the instructions of section 4.4.3.3.2.



NOTES:

* C5633, C10414 OR C1611 THE IC's CAN BE INTERFACED DIRECTLY WITH THE RT's.

** CAN ALSO BE USED WITH AN RT-1476A BUT NOT TESTED IN THAT CONFIGURATION IN THIS SPECIFICATION.

1) VARIOUS CABLES ARE IDENTIFIED ELSEWHERE EITHER UNDER PARTICULAR TEST SETUPS OR UNDER SECTIONS 4.3.2 OR 4.4.1.1

Figure 4.5.3-1. Typical Aircraft Installation of RT (All probable installations not shown)

4.5.4 Transmitter Tests.

4.5.4.1 Forward and Reflected Power.

a. Connect a thru line type wattmeter between the RT-1476A connector J3 (connector J2 on Adapter Tray if RT-1477A is used) and the Aircraft communications antenna. Position the wattmeter as close to the RT as possible with the wattmeter element pointing in the direction of the antenna.

b. On the RT, set the MODE switch to SC, the PRESET switch to MAN (30.000 MHz) and the RF PWR switch to OFF.

c. If an SDC is installed, set the MODE switch to PT.

d. Key the transmitter via the headset PTT switch. A forward power reading of 10 watts +5.8, -3.7 watts (+40 dBm ±2 dB) shall be obtained for an antenna termination of 50Ω.

e. With the wattmeter element pointing toward the RT, key the transmitter and read the reflected power. The reflected power shall not exceed 4.4 watts (assumes 10W forward power). If there is no reflected power, the criteria of step d shall apply. If 4.4 watts of power are reflected, 5.6 watts are transmitted and a VSWR of 5:1 is present.

f. Repeat steps a, c, d, and e at each of the six PRESET frequencies and at the CUE frequency (see 4.5.3.e).

4.5.5 SC Communication Check.

4.5.5.1 Radio Performance in SC/PT. Utilizing the SINCGARS (or compatible FM) GFE radios and also utilizing selected frequencies (see section 3.1.5), set the RT under test and the GFE Ground radio to the authorized, selected frequencies and establish communication between the two radios. For this test, all normal RT connections to Aircraft antennas and normal optional auxiliary equipment shall be established (includes an installed SDC). The RT and SDC (if applicable) switch settings shall be the same as listed in section 4.5.3 unless otherwise noted.

NOTE: The RT RF PWR switch can be in either the OFF or NORM position. The OFF position is recommended. Without an IFM AM-7189A connected, sidetone can only be heard with the RT IFM RF PWR switch in the OFF position. If an IFM AM-7189A is connected, verify that all six interconnecting leads between the RT ancillary connector (J2) and the IFM are in place (especially J2-U to IFM connector pin A).

During communications, check, the action of the volume control. In addition, note that the selected channels are heard loud and clear without undesirable chirps and hums, and that adequate sidetone is audible during all transmissions.

4.5.5.2 Radio/SDC Performance in SC/CT. If an SDC is installed, a SC/CT communication test shall be performed utilizing the same authorized, selected frequencies as used in 4.5.5.1. Place the SDC and GFE Ground radio/equipment in CT mode (RMT/CT on the SDC) and ensure that both equipments have the same COMSEC variable (TEK) loaded. The switches of the RT under test shall remain as set in 4.5.5.1. Establish communications between the two radios and verify that the selected channels are heard loud and clear, and that adequate sidetone is audible during all transmissions. If physically possible (depending on remote/local configuration), check the action of the SDC CT VOLume control. Upon completion of the test, return the SDC and GFE Ground radio mode setting to PT.

4.5.6 FH Communication Check.

4.5.6.1 Radio Performance in FH/PT. Utilizing the SINCGARS GFE radios and also utilizing an approved hopset, fill and set up the RT under test and the GFE Ground radio for FH communication as specified in 4.4.3.9. For this test, all normal RT connections to Aircraft antennas and normal optional auxiliary equipment shall be established (includes an installed SDC). If an SDC is installed, the switch settings shall be set as specified in section 4.5.3 unless otherwise noted.

4.5.6.2 Radio/SDC Performance in FH/CT. If an SDC is installed, an FH/CT communication test shall be performed utilizing the same hopset and equipment setup as described in 4.5.6.1. Place the SDC and GFE Ground radio/COMSEC equipment in CT mode (RMT/CT on the SDC) and ensure that both equipments have the same COMSEC variable (TEK) loaded. The switches of the RT under test shall remain as set in 4.5.6.1.

Establish communication between the two radios. During communications, note that each transmission is heard loud and adequately clear, and that sidetone is audible during all transmissions.

4.5.7 Retransmission Check. This test applies only if two base stations are available. Perform this test if the Aircraft detail specification has a retransmission requirement.

a. Establish two base stations of FM compatible radios, each located at least one-half mile and not greater than two miles from the aircraft.

b. Set the base stations to the desired retransmit frequencies.

c. Set the appropriate aircraft radios to the desired retransmit frequencies and place their function switches and/or Aircraft RETRAN switches and audio controls to the RXMT position. Mode of operation is to be single channel.

d. If an SDC is installed, ensure that its MODE switch is in the PT position.

e. Establish communications between base stations through the Aircraft radios.

f. Note that the selected frequencies are heard loud and clear and that received audio is present and clear at each Aircraft crew station during retransmission.

4.5.8 Homing Tests.

a. Set the RT under test MODE switch to HOM position.

b. If an SDC is installed, set the MODE switch to PT.

c. Call for another FM radio in the immediate area to transmit on a frequency between 30 and 80 MHz.

d. Note the homing indicator mounted in the A/C.

e. The various pointers shall deflect depending upon relative signal strength and direction of the transmitting radio. For example, the signal strength flags should flip to all solid color and the station approach indicator should move away from its no signal position. The steering indicator pointer may move away from its "0" center position (dependent on the source radio's position relative to the `radio under test').

4.6 Flight Tests. Flight tests shall be performed to determine that the AN/ARC-201A(V) subsystem will operate satisfactorily while all normal in-flight equipment in the Aircraft is functioning. During the tests specified, observe and verify the following: (All tests shall be performed in SC/PT Mode using voice modulation.)

a. That squelch action keeps the receivers of the RT-1476A. RT-1477A, or RT-1478A quieted except during reception of on-channel signals above the squelch level.

b. The presence of adequate sidetone in the headsets at all crew positions having facilities to monitor the intercom system (without an IFM AM-7189A connected. sidetone can only be heard with the RT IFM RF PWR switch in the OFF position). (With an IFM in use, ensure that all six interconnect lines between RT J2 and IFM connector are in place.)

NOTE: The radio propagation path profile over which the flight tests prescribed in 4.6.1 communication test and 4.6.2 homing test are run must be above the radio horizon at the stated range and altitude. Additionally, the compatible GFE Ground station radio must be equipped with a standard, omni-directional, vertically-polarized antenna, and must be sited in a clear area for the selected path.

4.6.1 Communication Test. A communication range test shall be conducted on each of the test frequencies selected. The aircraft shall be flown in a circular path at a distance from the Ground station of 40 statute miles (35 nautical miles), at an altitude of 1200 feet above the terrain. During the turn, communications shall be established using the AN/ARC-201A(V) to demonstrate that a reliable acceptable two-way interchange can be maintained throughout the entire 360 degree turn. The test shall be performed at three frequencies across the 30 to 80 MHz band.

4.6.2 Homing Tests. During the communication range test, the RT shall be set to the homing mode and the homing indicator shall be monitored to verify the signal strength and station approach functions operate properly. Also the steering indicator should swing between right and left limits as the circular path is flown. Verify homing operation at the same frequencies at which the communication test is performed.

5.0 EXTERNAL CONNECTORS AND SIGNAL CHARACTERISTICS

The following tables contain descriptions of the signal interface characteristics for each of the external connectors of the AN/ARC-201A(V) aircraft subsystem.

- Table 5.0-1 shows a list of connectors and part numbers including mating connectors.
- Table 5.0-2 shows a list of pins and corresponding signal characteristics for J1 and J2 of all three RT configurations.
- Table 5.0-3 shows a list of pins and signal characteristics for J3, J4, J5, and J6 for all three RT configurations.
- Table 5.0-4 shows the pins and signal characteristics for J7, J8, and J9 for RT-1478A only.
- Table 5.0-5 lists the pins and signal characteristics for J1 of Remote Control Unit.
- Table 5.0-6 lists the pins and signal characteristics for the J1, J2, and J3 connectors of the Signal Data Converter.
- Table 5.0-7 lists the pins and signal characteristics for J1, J2, P1 and P2 of the SDC MT-6710 Adapter Tray.
- Table 5.0-8 lists J1 pins and signals for the Mounting Base Adapter.
- Table 5.0-9 covers J2, J3, and J4 of the Mounting Base Adapter.

Table 5.0-1. List of Connectors and Part Numbers Including Mating Connectors

Receiver/Transmitter			Similar to Part No.	Mating Conn. Part No.
J1	System		MS27508E18F32P	MS27484T18F32S
J2	Ancillary		MS27508E16F26S	MS27484T16F26P
J3,J4,J5	Antenna		UG-1364( )/U	UG-1366( )/U
J6	Fill		General Conn. GC283-1	GC329
J7	Address		MS27508E12F98S	MS27484T12F98P
J8	1553 Bus	Raychem	D-621-0012 shell	D-621-0011 shell
J9	1553 Bus	Raychem	D-602-0126 contact	D-602-55 contact
Control				
J1	Control		MS3122E24-61P	MS3126F24-61S
Signal Data Converter				
J1	Radio		MS3122E16-26P	MS3126F16-26S
J2	Audio/Data		MS3122E14-19P	MS3126F14-19S
J3	Fill Audio/Data (A/D)		Gen. Conn. GC283-1	GC329
Mounting Base				
J1	System		MS24308/4-5	MS24308/1-16
J2,J3,J4	Antenna	Cannon	DM53740-5101	DM53742-5086
P1	System		MS27484T18F32S	MS27508E18F32P
P2	Auxiliary		MS27484T16F26P	MS27508E16F26S
P3,P4,P5	Antenna		UG-1366( )/U	UG-1364( )/U
P3	Battery		M24308/3-1	M24308/1-1
MT-6710 Adapter Tray				
J1	Audio/Data		MS3474L12-10P	MS3126F12-10S
J2	Radio		MS3474L16-26PW	MS3126F16-26SW
W2P1	Audio/Data		MS3475L14-19S	MS3122E 4-19P
W1P2	Radio		MS3475L16-26P	MS3122E16-26P

Table 5.0-2. Connector Pin Descriptions for J1 and J2 of RT's (RT-1476A, RT-1477A, and RT-1478A)

J1 SYSTEM CONNECTOR		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
A	SIG STR RET	ID1351A Meter return
B	STA APP	0-200 µA, -103 to -30 dBm, to ID1351A
C	115V DIM CTL	0-115Vac, from A/C PWR Bus, 400 ±25 Hz
D	28V PWR	28 Vdc, 3.9 A max
E	28V PWR RET	28V return
H	RXMT CTL OUT	GND for RXMT
J	XMIT MODE	±5V, 16 kbps
K	XMIT AUDIO/ RXMT MODE	XMIT Audio: [1 or 50 mW]/150 Ω RXMT Mode: +6.75V
L	XMIT AUDIO RET	Return for XMIT Audio
M	115V DIM RET	Return for 115 Vac dim, from A/C Pwr Bus
N	RXMT A/D SEL	Bidirectional, Digital=GND; Analog>1V
P	CHASSIS GND	
R	SIG STR	21-30V: Adequate signal (not used)
T	STEERING RT	0 to ±200 µA, 1K load, to ID1351A
U	STEERING LT	Steering return, to ID1351A
V	STA APP RET	STA APP return, to ID1351A
X	RXMT SIG OUT	Analog: 220 mVrms, 10 Hz-10 kHz Digital: ± 5V, 16 kbps
Y	RXMT SIG IN	Characteristics same as RXMT SIG OUT
Z	RXMT CTL IN	SIG RCVD=0V, +6.75=Otherwise
a	GND	
c	REC XMODE/ PRE CONT	REC XMODE: ±4V, 17 kbps PRE CONT: SC=GND, FH=+6.75
d	REC AUDIO	50 mW nom/150Ω (opt 1 mW/150Ω)
e	REC AUDIO RET	Balanced RTN for RCV Audio
g	X-MODE SEL	GND=XMODE, OPEN=ANALOG
h	XMIT CONTROL (PTT)	XMIT=GND, +6.75=Otherwise
F	BATTERY (+6 VOLTS)	6 Volts Dc Input
G	EXTERNAL ZEROIZE	GND=Zeroize
S	SPARE	
W	SPARE	
b	SPARE	
f	SPARE	
j	SPARE	

J2 ANCILLARY CONNECTOR		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
A	IFM PWR A OUT	Open collector enable to 7189/A
B	TUNE CLOCK	320 kHz clock, 50% duty cycle 16 clock pulses at 1 sec intervals
C	TUNE GATE-N	Active zero, 50µsec @ 0.5 sec intervals
D	ECCM/SC	GND-ECCM, OPEN-SC
E	GND	
F	CLOCK (-)	2.0-6.0V, 640 Hz ±10 Hz
G	CLOCK (+)	Balanced clock input
H	POWER ON/OFF	+28V=PWR On, Open=PWR Off
J	DATA DIRECTION	+5V=Data Input, 0V=Data Output
K	TAKE CONTROL	GND=Not in control, Open=In control
L	IFM FAULT	GND=No Fault, Open=Fault
N	DATA (+)	Balanced digital input
M	DATA (-)	2.0-6.0V, 640 ± 10 Hz
P	IFM-TR	Open Collector, GND-XMIT
R	IFM PWR B OUT	Open collector to 7189/A
S	HOP TIME	Disable=0V, Otherwise=6.75V
T	SERIAL DATA	NRZ format data, 16 bits 3.12.µsec duration @ 0.5 sec interval
U	HI/LO BAND	GND=30-52 MHz, Open=52-88 MHz
W	CLOCK OUT	16 kHz square wave
X	PT/CT	PT=28V; CT=open: without Z-AHP and Z-AHQ. PT=open; CT/digital=gnd
Y	DATA OUT	16 kbs, 6.75V/0V
Z	INTERCOM RET	Connect together when C1611 I/C is present
a	INTERCOM SEL	Connect together when C1611 I/C is present
V	GROUND	
b	ZAHQ LOAD	
c	ZAHQ JUMPER	

Table 5.0-3. Connector Pin Description for J3, J4, J5, and J6 of RT's (RT-1476A, RT-1477A, and RT-1478A)

CONNECTOR	NAME	SIGNAL
J3 Coax	Communications Ant	RF: 30 to 88 MHz
J4 Coax	Right Homing Ant	RF: 30 to 88 MHz
J5 Coax	Left Homing Ant	RF: 30 to 88 MHz

J6 FILL CONNECTOR

PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
A	GROUND (GND)	Signal Ground
C	FILL REQUEST (FILL REQ)	Quiescent State: 0V Active State: -6.75V
D	FILL DATA (FILL INFO)	Logic Zero: 0V Logic One: -6.75V
E	FILL I/A (CLOCK)	Logic Zero: 0V Logic One: -6.75V Data Rate: 1.6 kHz to 4 kHz

Table 5.0-4. Connector Pin Descriptions for J7, J8, and J9 (RT-1478A Only)

J7 ADDRESS CONNECTOR		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
1	A (LSB)	
2	B	
3	C	
4	D	Logic 0 = GND
5	E (MSB)	Logic 1 = Open
6	PARITY	
7	GROUND	
8	EMERGENCY-N	
9	ZEROIZE-N	

J8 (BUS A) J9 (BUS B) CONNECTORS		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
J8	BUS A	
1	DATA	Bipolar, Biphase
2	DATA	±9V to ±13.5V p-p line to line
J9	BUS B	
1	DATA	Bipolar, Biphase
2	DATA	±9V to ±13.5V p-p line to line

Table 5.0-5. Connector Pin Descriptions for J1 of Remote Control Unit (C-11466A)

J1 CONTROL CONNECTOR		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
KK, d, B	GND (Audio com)	Audio Return (gnd)
C, F	+28 Vdc	28 Vdc
N	REC PT AUDIO OUT	Vol. controlled audio out, +17 dBm or 0 dBm nom.
G	CLOCK (-)	2.0 to 6.0V, 640 ± 10 Hz
T	CLOCK (+)	Balanced input
P	POWER ON/OFF	+28V=Pwr On, Open-Pwr Off (pull down in RT)
X	DATA DIRECTION	+5V=Data Output, 0V-Data Input
W	115V RET	Return for 115 Vac
a	115V CTL	0-115 Vac, 400 ±25 Hz, from A/C dim control
CC	DATA (+)	2.0 to 6.0V, 640 ±10 Hz
BB	DATA (-)	Balanced input
JJ	REC AUDIO	Unattenuated audio +17 or 0 dBm into 150 Ω
q, v	PTT	Xmit-Gnd, +6.75V otherwise
A, S	RXMT SIG OUT	Analog = 220 mVrms, 10 Hz - 10 kHz; Digital = ±5V, 16 kbs
R, c	RXMT SIG IN	Same as RXMT SIG OUT
Y, u	RXMT CTL IN	Sig Rcvd = 0V; +6.75V otherwise
HH, m	RXMT CTL OUT	GND for RXMT
MM, NN	STA APP (HOR PT DN +)	C 200µA, -103 to -30 dBm, to ID 1351A
t, s	STEER RT (VERT PT RT +)	0 to ±200 µA, 1K load; to ID 1351A
U, FF	SIG STR RET (FLAGS -)	ID 1531A indicator return
GG	FLAGS +	+27.5V via 2K resistor (IN HOMING MODE)
DD	HOMING OPR	+27.5V to HOMING RELAYS K53/K54 (in HOMING MODE)
x, v	XMIT AUDIO	1 or 50 mw at 150 ohms
b	28V RETURN	
L	TAKE CONTROL	"Open" - control; gnd = no control
w	SYSTEM GND	
J, PP	RXMT A/D SEL	GND = digital; analog > 1.0V
Z	1-ZERO-N	

The following pins are spare: D, E, H, K, M, V, LL, e, f, g, h, i, i, i, k, n, p, r, z, AA, EE

Table 5.0-6. Connector Pin Descriptions for the SDC.

SDC Radio Connector (J1)			
PIN	NAME	TYPE	CHARACTERISTICS
A	XMIT AUDIO/RXMT	Audio Output.	1 mW (nominal) into 150Ω
		Control Input	+6.75V for RXMT mode.
B	RTD	Control Input (Remote)	Gnd for COMSEC TD mode. Open otherwise (100 KΩ to -6.2Vdc). Valid only when ORR (J1-D) is active.
C	MUX/ZERO	Digital Input. (Remote)	MUX: 0V = Logic 0 -13V = Logic 1 Data @ 3.5Kbps (nominal) Valid only when ORR (J1-D) is active.
		Control Input	ZERO: +18Vdc to +29Vdc for > 100 msec
D	ORR	Control Input (Remote)	Gnd for Remote override. Open otherwise (100KΩ to -6.2Vdc).
E	*N.A.		
F	XMODE XMIT	Digital Output	±4V to ±6V @ 1[illegible]s
G	CGC	Control Output	Open (collector) in PT. GND in CT.
H	LAMP POWER IN	Power Input	0Vdc to +28Vdc.
J	BLACK GND		
K	+28V RET		
L	+28 VDC PRIMARY	Power Input	+24Vdc to +29Vdc. +28Vdc nominal.
M	EXT HUB	Power Input	+7.5Vdc nominal.
N	XMODE CNTL	Control Output	Gnd for XMODE (PT digital CT Voice and Data). Open (collector) for PT Voice.

*not available for use

Table 5.0-6. Connector Pin Descriptions for the SDC (Cont.)

SDC Radio Connector (J1) (cont)			
PIN	NAME	TYPE	CHARACTERISTICS
P	*N.A.		
R	RCV AUDIO	Audio Input	50 mW into 150Ω, 300 Hz to 6 kHz.
S	GND		
T	GND		
U	RXMT MODE	Control Input	Gnd for RXMT mode, Open otherwise (100 KΩ to -6.2Vdc).
V	*N.A.		
W	*N.A.		
X	SYS PTT/PTT OUT	Control Input,	Switch closure to Gnd for transmit. Open otherwise
		Control Output	Gnd to transmit. Open (collector) otherwise.
Y	*N.A.		
Z	*N.A.		
a	PT/CT IN (XMODE SEL)	Control Input,	+10Vdc to +28Vdc for PT (min. 1KΩ series source resistance required). Open or Gnd for CT.
		Control Output	Gnd for PT digital. 8.1KΩ pull-down for CT (when PT/CT IN control input open).
b	XMODE RCV	Digital Input	±4V to ±6V @ 16Kbps
c	RMT ZEROIZE	Control Input	Switch closure to Gnd to zeroize all variables. Open otherwise (1MΩ pull-up to +6.75Vdc HUB).

* Not available for use

Table 5.0-6. Connector Pin Descriptions for the SDC (Cont.)

SDC Intercom A/D Connector (J2)			
PIN	NAME	TYPE	CHARACTERISTICS
A	XMIT AUDIO	Audio Input	1 mW (nominal) into 150Ω. (NOTE: Common with J2-M)
B	XMIT AUDIO RET	Audio Gnd	Common with J2-N.
C	RCV DIGITAL DATA	Digital Output	±4V to ±6V at rates of 600 bps to 16 Kbps. Logic levels per MIL-STD-188-114.
D	XMIT DIGITAL DATA	Digital Input	±4V to ±6V at rates of, 600 bps to 16 Kbps. Logic levels per MIL-STD-188-114
E	ADMC-N	Control Input	Gnd for Analog Data mode (when AD1 selected), open otherwise (100KΩ to -6.2V).
F	GND		
G	*N.A		
H	*N.A (Spare)		
J	ANALOG DATA OUT	Analog Output	1200/2400 Hz analog data @ 600 bps or 1200 bps. (NOTE: Common with J2-K)
K	RCV AUDIO	Audio Output	50mW (nominal) into 150Ω, 300 Hz to 6 KHz. (NOTE: Common with J2-J)
L	RCV AUDIO RET	Audio Gnd	
M	AUX XMIT AUDIO	Audio Input	1mW (nominal) into 150Ω. (NOTE: Common with J2-A)
N	AUX AUDIO RET	Audio Gnd	Common with J2-B.
P	PTT IN	Control Input	Switch closure to Gnd for transmit, Open otherwise.
R	DDMC-N	Control Input	Gnd to activate digital data mode (when in TF, 16Kbps, or low speed data modes), Open otherwise (100KΩ to -6.2Vdc).

*not available for use

Table 5.0-6. Connector Pin Descriptions for the SDC.(Cont)

SDC Intercom A/D Connector (J2) (continued)			
PIN	NAME	TYPE	CHARACTERISTICS
S	ANALOG DATA IN	Analog Input	1200/2400Hz analog data @ 600 bps or 1200 bps. (NOTE: Common with J2-A.M)
T	*N.A.		
U	*N.A. (Spare)		
V	DGTL DATA CLK OUT	Digital Output	±4V to ±6V digital clock @ 600 bps to 16 Kbps. Supplied when actively transmitting or receiving in digital data mode.

* not available for use

Table 5.0-6. Connector Pin Descriptions for the SDC (Cont.)

SDC FILL A/D CONNECTOR (J3)			
PIN	NAME	TYPE	CHARACTERISTICS
A	REF	Logic Reference	
B	CCD/A-D RCV	Digital I/O	CCD: 0V = Logic 1, -6.75V = Logic 0. (Valid when in LD mode)
		Audio Output,	ARCV: 7.8Vrms (MAX) into 600Ω
		Digital Output	DDR: ±4V to ±6V (Valid when not in LD mode)
C	REQ/PTT	Control I/O	REQ: 0V = Logic 1, -6.75V = Logic 0. (Valid when in LD mode)
		Control Input	PTT: Switch closure to Gnd for transmit. Open otherwise. (Valid when not in LD mode)
D	FILL/AUD XMT/ DDCO	Digital I/O	FDATA: 0V = Logic 1, -6.75V = Logic 0. (Valid when in LD mode)
		Audio Input, Digital Output	AXMT: 1.4mVrms to 250mVrms DDCO: ±4V to ±6V (Valid when not in LD mode)
E	FCLK/DDMC-N	Digital I/O	FCLK: 0V = Logic 1, -6.75V = Logic 0. (Valid when in LD mode)
		Control Input	DDMC: Gnd to activate dgtl data mode. (when in TF, 16Kbps, or low speed data modes). Open otherwise. (Valid when not in LD mode)
F	MUX OVRD/DDT	Control Input	MOVRD: -6.75V for MUX override, open otherwise. (Valid when in LD mode)
		Digital Input	DDT: ±4V TO ±6V. (Valid when not in LD mode)

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Table 5.0-7. Connector Pin Descriptions for SDC Adapter Tray (MT-6710)

J1 CONNECTOR TO INTERCOM AUDIO/DATA	P2 CONNECTOR TO SDC	DESCRIPTION
F	K	RCV AUDIO
K, J	L	RCV AUDIO RETURN AUDIO COM RETURN
H	B	XMIT AUDIO RETURN
A	A	XMIT AUDIO

J2 TO RADIO	P1 TO SDC	SIGNAL DESCRIPTION
G	R	RCV AUDIO
D	b	XMODE RCV
V	A	XMIT AUDIO/RXMT
P	F	XMODE XMIT
W	a	PT/CT IN (XMODE SEL)
M	X	SYS PTT/PTT OUT
R	S	GND
E	D	ORR
Y	B	RTD
H	C	MUX/ZERO
J	L	28 Vdc
K	K	28 V RET

Table 5.0-8. Connector Pin Descriptions for J1 on Adapter Tray Mounting Base

J1 SYSTEM CONNECTOR		
PIN	SIGNAL NAME	SIGNAL CHARACTERISTIC
1	CHASSIS GND	
2	28V PWR RET	Gnd
5	XMIT AUDIO RET	
6	XMIT AUDIO/	XMIT Audio: 0 or +17 dBm into 150Ω
	RXMT MODE	RXMT Mode: +6.75 Vdc
7	XMIT MODE	±5V, 16 KBPS
9	DATA DIRECTION	+5V=Data output, 0V=Data input
10	RXMT CTL IN	0V=Signal Rcvd, +6.75=Otherwise
11	T-ZERO-N	
13	REC AUDIO	+17 dBm nom/150Ω
14	REC AUDIO RET	
15	REC XMODE/	RCV Xmode: ±4V, 16 kbps
	REC CTL	Pre Cont: SC=GND, FH=+6.75V
17	STEER RT	0 to +200 µA, 1K load, to ID1351A
19	STEER LT	Steering return, to ID1351A
20	STA APP	0-165 µA, -103 to -30 dBm, to ID1351A
21	STA APP RET	
22	CLOCK (+)	2.0-6.0V, 640 ±10 Hz
23	CLOCK (-)	Balanced clock input
24	DATA (+)	2.0-6.0V, 640 ±10 Hz
25	DATA (-)	Balanced digital input
27	SIG STR RET	
28	PWR ON/OFF	+28V=Pwr on, Open=Pwr off (pull down in RT)
29	RXMT A/D SEL	Gnd = digital; analog > 1.0V
31	RXMT CTL OUT	GND in RXMT
32	PT/CT	PT=28V; CT=open ckt; w/o Z-AHP and Z-AHQ: PT=open; CT/digital=GND
33	RXMT SIG IN	Analog: 220 mVrms, 10 Hz - 10 kHz Digital: ±5V, 16 kbps
35	RXMT SIG OUT	Analog: 200 mVrms, 10 Hz - 10 kHz Digital: ±5V, 16 kbps
36	28V PWR	28 Vdc, 3.9 A max.
38	GND	
39	X-MODE SEL	GND-Xmode, Open-Analog
40	INTERCOM SEL	Connect to intercom Rtn (43) for C1611 intercom
41,44	XMIT CTL (PTT)	XMIT=Gnd, +6.75 = Otherwise
43	INTERCOM RTN	Refer to pin 40
45	IFM PWR A OUT	Open collector to IFM AM-7189/A
46	IFM PWR B OUT	Open collector to IFM AM-7189/A
47	IFM FAULT	Gnd=No fault, Open=Fault
48	ECCM/SC	GND=ECCM, Open=SC
49	HI/LO BAND	GND=30-52 MHz, Open=52-88 MHz
50	IFM T/R	Open collector, GND=XMIT

Table 5.0-9. Connector Pin Descriptions for J2, J3, J4, and P3 of Adapter Tray Mounting Base

CONNECTOR	NAME	SIGNAL
J4 (P3) Coax	Communications Ant	RF: 30 to 88 MHz
J2 (P5) Coax	Left Homing Ant	RF: 30 to 88 MHz
J3 (P4) Coax	Right Homing Ant	RF: 30 to 88 MHz
P3 Pin 4	Battery (-)	Ground (Part of W1)
Pin 3 Pin 5	Battery (+)	+6V (Part of W1)

APPENDIX A

1. LOADING TRANSEC VARIABLES AND HOPSETS UTILIZING THE MX-18290/VRC FILL DEVICE AND THE KOI-18 TAPE READER

2. LOADING CRYPTOVARIABLES USING THE KYK-13

APPENDIX A

Loading TRANSEC variables and Hopsets utilizing the MX-18290 FILL device and the KOI-18 tape reader.

PART 1

- Loading the AN/ARC-201A(V) series of Radios from the MX-18290 FILL device

This procedure is covered in sections 4.4.3.3.4 and 4.4.3.9. It is used when the MX-18290 is already loaded and is storing TRANSEC variables, Hopsets and Lockouts. The MX-18290 permits the storing of any mixture of 13 Hopsets and associated TRANSECs and Lockouts (in positions 1 through 13). Loading of the MX-18290 from a KOI-18 tape reader is covered in Part 2 of this appendix.

To verify the presence of stored parameters in any of the MX-18290 channels, set the select switch to the channel of concern and with the on/off switch set to OFF, depress the pushbutton on the MS-18290. If something is stored at that location, the check lamp will flash. If nothing is stored, the check lamp will remain off.

Selective erasure of any stored parameter in the MX-18290 is not possible. It it is desirable to change any stored Hopset and TRANSEC, or Lockout variable at a particular location, just "write" the new one in from a tape reader, and it will replace the one that was previously stored at that location. Selector position A is utilized for transference of all stored information in one MX-18290 fill device to another fill device. If erasure of all stored information in the MX-18290 is desired, place the select switch in any position, depress the push button switch and hold it while operating the on/off switch to the spring loaded "Z" position.

PART 2

- Loading the MX-18290 FILL device from a KOI-18/TSEC tape reader

Before this operation can be performed, it is necessary to have encoded tapes containing the required Hopsets with associated TRANSECs (or Lockouts) available. Preparation of tapes involves a computer and classified COMSEC software and is not a part of this document.

The following steps are required for this procedure:

a) Connect the KOI-18/TSEC tape reader connector directly to the mating connector, P1, of the MX-18290 FILL device. (NOTE: The KOI-18/TSEC is a controlled COMSEC item.) (Refer to Appendix B for alternate device connections.)

b) Place the tape containing the desired encoded information at the slot labeled IN under the cover of the KOI-18. Position the tape so that the end with the point is at the slot and the perforations line up with the dots adjacent to the arrow

c) Push the tape leader into the IN slot until the tape emerges from the OUT slot. Pull the tape through the device stopping just before the encoded portion of the tape reaches the IN slot.

d) On the MX-18290, place the ON/OFF/Z switch to ON and the select switch to the channel to be loaded; 1 through 13 for Hopsets (or Lockouts).

e) Depress the pushbutton on the MX-18290 and release.

f) Pull the tape through the KOI-18 reader with a steady, continuous motion.

g) While the tape is passing through the reader, the check lamp on the MX-18290 will blink if the transfer and loading is successful.

h) To verify that the desired information has been loaded into the MX-18290, place the OFF/ON/Z switch in the OFF position, leave the selector switch in the position being verified and depress the pushbutton switch. The check lamp will flash if something has been loaded into that location of the MX-18290 memory.

i) Repeat the preceding steps to load each of the MX-18290 memory locations as desired. Separate tapes are required for each Hopset and TRANSEC (or Lockout).

j) Refer to Part 1 for use of the MX-18290 FILL device with the AN/ARC-201A(V) radios.

PART 3

- Loading the AN/ARC-201A(V) radios directly from the KOI-18/TSEC tape reader

Refer to the first paragraph of Part 2 regarding availability of encoded tapes.

The following steps are required to perform this operation:

a) Connect the KOI-18/TSEC tape reader (a controlled COMSEC item) to the applicable radio FILL connector using a special interconnect cable (six conductor cable with GC-329 connectors on each end). (Refer to item 4 in Appendix B.)

b) Set the radio function switch to LD.

c) On the radio, press LOAD switch once and pull the tape through the KOI-18 reader with a steady, continuous motion. Repeat step (c) using the desired Hopset tape.

d) Successful transfer will be indicated by display of Hopset number.

e) On radio. press Sto and the channel number where Hopset is to be stored. Setting the preset switch to that channel will display the Hopset number (same as displayed in step g).

f) Repeat steps (e) through (h) for loading of additional Hopsets. (Separate tapes are required for each hopset.)

PART 4

- Loading AN/ARC-201A(V) radios which have cable extensions from the FILL connector to an Aircraft (A/C) panel (loading from either the MX-18290 or the KOI-18/TSEC devices)

The FILL extension cable will typically have a panel mounted connector of the opposite "sex" from that of the FILL connector on the RT. This will permit direct connection to the KOI-18/TSEC tape reader or to J1 of the MX-18290 without additional interconnect cables as specified in Part 3 of this Appendix. Note that the MX-18290 has two connectors (on opposite faces) of opposite "sex." P1 is used in parts 1 and 2 of this appendix where direct connection to the RT or KOI-18 is desired. J1 is now specified where connection to the opposite sex panel connector is desired.

The loading procedures using the A/C mounted FILL extension cable are the same as listed in Parts 1 and 3 once the above connections are established.

PART 5

- Loading COMSEC variables into the SDC using the KYK-13 Fill device

The following steps are required to perform this operation:

a) With the MODE switch in the RMT/CT position, clear the pulsed crypto alarm by keying SDC PTT twice.

b) Place the SDC MODE switch in the LD position.

c) Connect KYK-13 COMSEC fill device (a controlled cryptographic item) to the Fill connector of the SDC.

d) Turn the power switch of the Fill Device to ON.

e) Set the Variable switch of the Fill Device to the desired position.

f) Set the VARiable switch of the SDC to the desired variable location.

g) Key SDC PTT once and release (successful transfer is indicated by a "beep" on the intercom RCV AUDIO Line).

h) Repeat steps (e) through (g) to load each desired variable location.

i) Turn power switch of Fill Device to OFF and remove from SDC Fill connector.

j) Place SDC in RMT/CT position.

k) Key SDC once in each variable position loaded to verify presence of COMSEC variable. (Presence is indicated by a single "beep" on PTT. Absence of variable is indicated by a continuous 1 kHz tone).

APPENDIX B

ACCESS TO THE FILL CONNECTOR ON THE AN/ARC-201A(V) RADIO SERIES

APPENDIX B

Access to the FILL Connector on the AN/ARC-201A(V) Radio Series

It is necessary that access to the FILL connector located on the front panel of each of the three radios, RT-1476A/ARC-201A(V), RT-1477A/ARC-201A(V), and RT-1478A/ARC-201A(V) be provided or be made easily available through use of extension cables or otherwise since this connector is used for the loading and Hopsets and TRANSECs (or Lockouts) for ECCM (frequency hop) operation of the RTs.

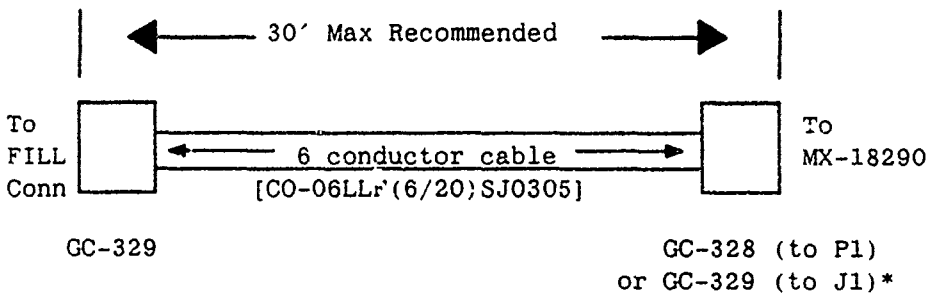
Several loading interfaces are considered as follows:

1. RT to MX-18290 FILL Device - Equipment to equipment direct connection.

This connection is described in part 1 of Appendix A. It requires enough clearance in front of the RT to connect the MX-18290 to the RT and to operate the controls. Ten to 12 inches is sufficient for this operation although more is desirable if available.

2. RT to MX-18290 FILL Device - Use of "local" extension cable.

Use of an extension cable between the two equipments permits cutting the required clearance in front of the RT to approximately 6 inches (enough to attach cable and provide a bend radius). The cable can be routed to a clear space and attached to the MX-18290. A cable conforming to the following sketch (or equivalent) is required.



(Pins A through F in each connector wired pin to pin)

* This is preferred. See item (4) of this appendix.

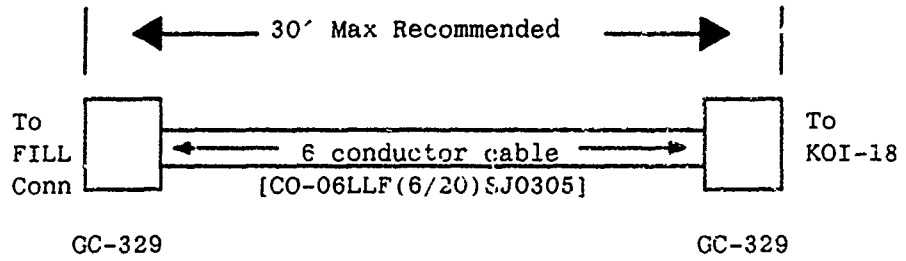
3. RT to MX-18290 FILL Device - Use of extension cable which is part of A/C wiring (permanently attached to A/C panel).

This configuration assumes that one end of the A/C extension cable is attached to the RT FILL connector (the RT may be in a location not readily accessible) and the other end of the cable is mounted to an A/C panel with ready access for connecting to the MX-18290 FILL device. (Refer to part 4 of Appendix A). This configuration requires approximately 10 to

12 inches clearance in front of the panel mounted connector for attachment and control of the FILL device.

4. RT to KOI-18/TSEC Tape Reader - Use of "local" extension cable.

This situation requires use of a cable conforming to the following sketch (or equivalent).



(Pins A through F in each connector wired pin to pin)

This is the same cable called out in part 3 of Appendix A. It is also the same as the preferred alternate listed in item (2) of this Appendix (the same local cable can be used for both configurations). The required clearance is 6 inches minimum in front of the RT to permit cable attachment and a bend radius. The cable can be routed to a clear space for attachment to the KOI-18.

5. RT to KOI-18/TSEC Tape Reader - Use of extension cable which is part of A/C wiring (permanently attached to A/C panel).

This configuration is the same as described in section (3) for RT to MX-18290. The assumptions and conclusions are the same as described in item (3) except KOI-18 replaces the MX-18290.

6. MX-18290 FILL Device to KOI-18/TSEC Tape Reader.

This connection can be performed in any location where space is available since both devices are small hand-held units. They can be directly connected (device to device) as described in part 2 of Appendix A or through the unpreferred "local" cable described in section (2). If the interconnect cable is desirable, a shorter 8 to 10 inch cable is more convenient to use, however.

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation.

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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